

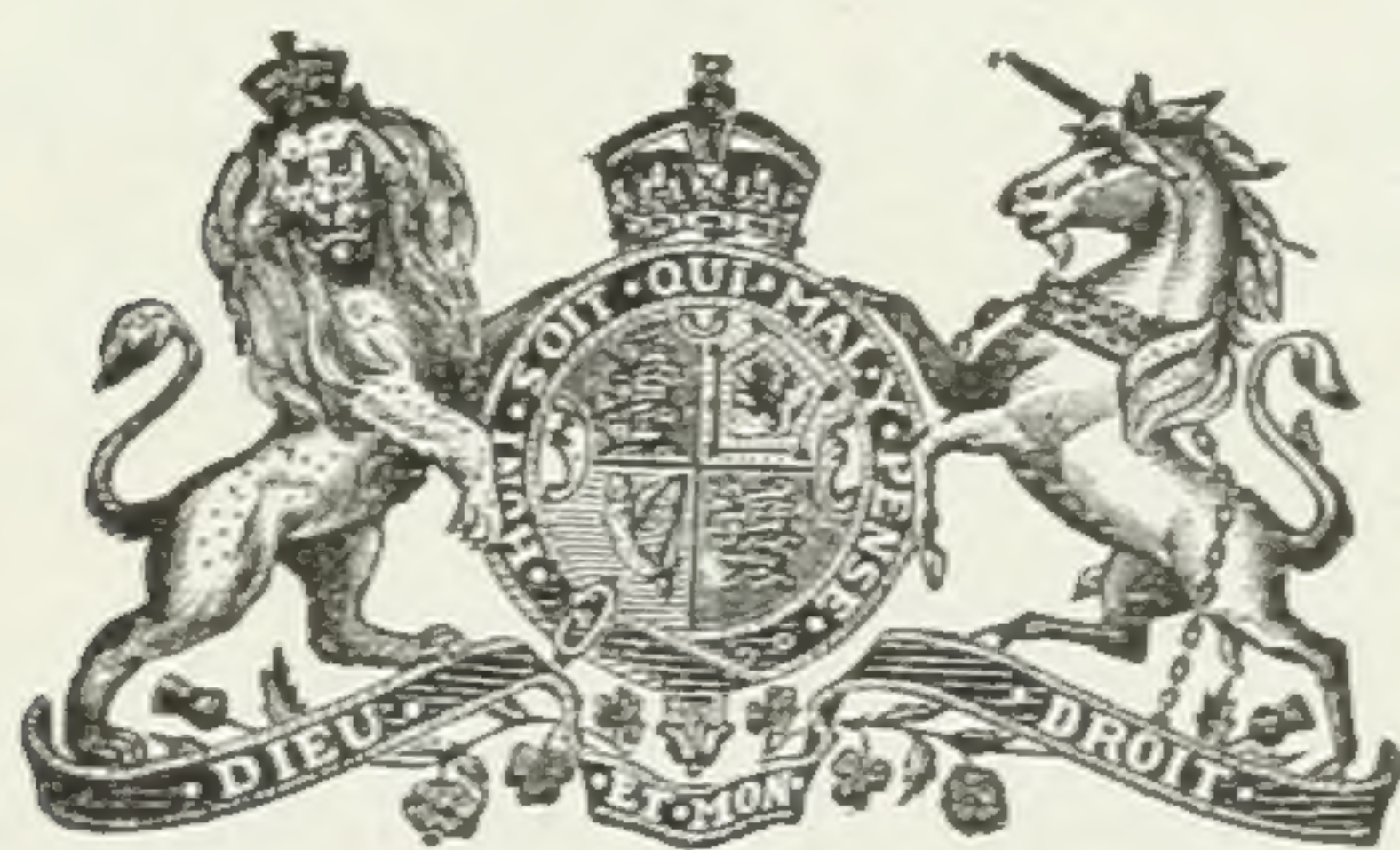
DEPARTMENT OF AGRICULTURE  
CANADA

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REPORT  
OF THE  
VETERINARY DIRECTOR GENERAL  
AND  
LIVE STOCK COMMISSIONER  
J. G. RUTHERFORD,

For the Year ending March 31, 1910

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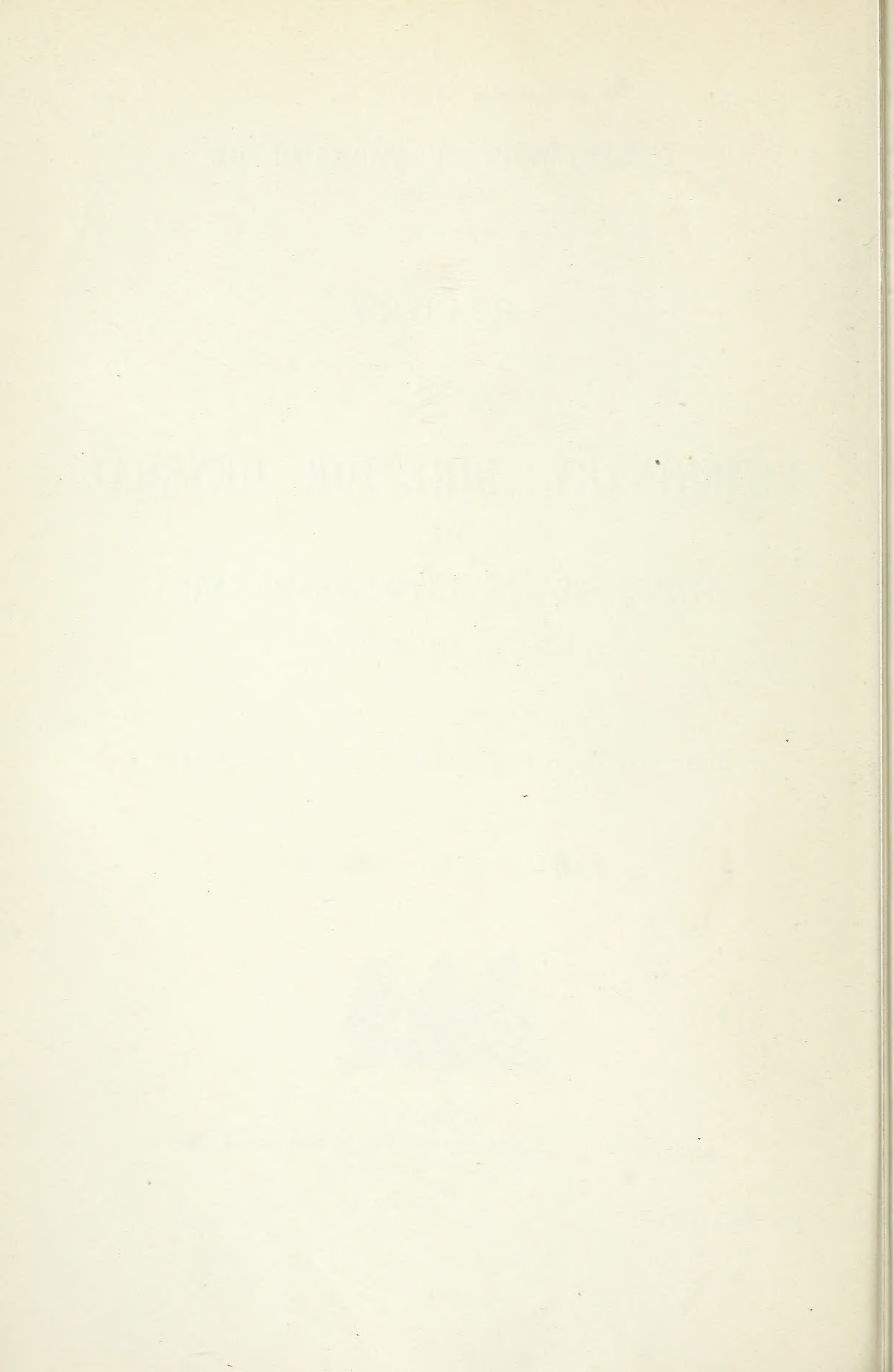
OTTAWA

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EXCELLENT MAJESTY

1911

[No. 15b—1912.]







## REPORT OF THE VETERINARY DIRECTOR GENERAL AND LIVE STOCK COMMISSIONER

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### HEALTH OF ANIMALS AND LIVE STOCK BRANCHES.

OTTAWA, March 31, 1910.

SIR,—I have the honour to present my report as Veterinary Director General and Live Stock Commissioner for the year ending March 31, 1910.

### HEALTH OF ANIMALS.

As will be shown by the statistics and other details, I am glad to be able to say that, in so far as the Health of Animals Branch is concerned, the progress made during the year in regard to the control of most of the diseases dealt with under the Animal Contagious Diseases Act has been very satisfactory.

### GLANDERS.

The results attending the aggressive policy, which has for some years back been followed in regard to glanders, are very gratifying, inasmuch as, while the number of animals tested is constantly increasing, the cases discovered are yearly becoming fewer and the amount of compensation paid correspondingly less.

A comparative statement covering the five years period, which has elapsed since the adoption of the new policy, will be found among the statistics published herewith.

### MALADIE DU COIT.

A few cases of dourine or maladie du coit are still from time to time discovered in Southern Alberta, but, although the disease still exists, it is gratifying to be able to report that its prevalence is greatly diminished, and that it has been practically confined to the district in which its existence was first discovered six years ago.

The research work in connection with dourine, conducted by Dr. Watson, Second Assistant Pathologist, at the Branch Laboratory near Lethbridge, Alta., is still being carried on. In Dr. Watson's report, which is printed as an appendix hereto, much valuable information will be found.

### MANGE.

The prevalence of mange of horses has also been greatly diminished, and there is every reason to believe that in the near future it will be entirely eradicated, although so far as range horses are concerned its control is a matter of the greatest difficulty.

Mange in cattle is also steadily decreasing under the policy of close supervision, adopted in 1908. This disease, like horse mange, is of but little importance among domestic stock, although on the range, where its rapid spread is favoured by the climatic and other conditions, it is apt, especially in severe weather, to give rise to serious losses.



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## SHEEP SCAB.

A few isolated outbreaks of sheep scab, involving in each case but few individual animals, have been dealt with by the officers of the department. With the exception of one case in British Columbia, where the disease was directly introduced from the United States, these outbreaks have been confined to the province of Ontario.

So far as can be ascertained this disease has now been completely eradicated from among Canadian sheep, and I am pleased to be able to report that the restrictions imposed by the United States authorities, whereby a quarantine of thirty days was required in the case of Canadian sheep entering that country for purposes other than slaughter, was in October last entirely removed, in consideration of this department taking certain precautions in regard to the dipping of stock of this class before shipment.

## HOG CHOLERA.

Several outbreaks of hog cholera have taken place during the year, but with the exception of a few cases in the neighbourhood of New Westminster, B.C., in which the origin of infection was traced to animals from the United States, these outbreaks have taken place only among swill fed hogs in the vicinity of various, widely separated, urban communities.

It is remarkable that these outbreaks have all occurred among hogs which, so far as I have been able to ascertain, have not been exposed to infection. Outbreaks under similar circumstances have been observed in other countries, but although they have been made the subject of exhaustive research and investigation, no definite explanation has yet been furnished. There is reason to believe that the infection is conveyed through animals eating among the swill and garbage on which they are fed, uncooked pork products, derived from infected hogs, but so far this theory has not been definitely proved.

Some experimental work in this connection is at present being carried on at the Biological Laboratory of this Branch, but so far without the acquisition of any additional information on the subject.

## RABIES.

The outbreak of rabies, which, beginning at Queenston, Ont., in May, 1907, gradually extended over the western peninsula of Ontario, assumed during the past year, such alarming proportions as to necessitate the adoption of somewhat stringent measures.

It was necessary in February last to secure the passage of an order in council requiring the muzzling, or detention under lock and key, of all dogs in that part of the western peninsula of Ontario lying west of the eastern boundaries of the counties of York and Simcoe. By securing the co-operation of the provincial health authorities, it was possible to minimize the expense of enforcing this order, which, although not as closely observed in some districts as it might have been, has already largely reduced the number of outbreaks.

In order to prevent the spread of the disease to other portions of the Dominion, the movement of dogs from the area above described was, early in March, entirely prohibited. As an illustration of the need for this precaution, I may cite the fact that an outbreak of rabies, which occurred last year in Alberta, was traced to a dog shipped from the infected area in Ontario several months previously.

The success which has attended the enforcement of these orders is such as to encourage the belief that the outbreak will shortly be entirely under control.

Although a great many human beings have been bitten by rabid or suspected dogs, the prompt measures adopted by the Ontario Board of Health, in providing for



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the application of the Pasteur treatment, have apparently been successful in counter-acting the infection, excepting one case where death supervened under very painful circumstances.

Large numbers of horses, cattle, sheep and swine have contracted the disease through being bitten by rabid dogs, some individual owners having in this way suffered rather serious losses.

While, owing to the long and open boundary between Canadian territory and that of the United States, it is almost too much to hope that we will be able to prevent the introduction of fresh infection from time to time, a task successfully accomplished in Great Britain by means of muzzling orders and strict quarantine precautions, I am inclined to believe that it will be possible to successfully control the present outbreak and keep it within bounds.

In some of the United States, where the disease exists continually to a greater or less extent, the wild animals have become infected. Such a condition enormously increases the risk of spreading the infection, and I need scarcely point out that should the disease ever obtain a foothold among the wild animals of northern Canada, it would be practically impossible to secure its eradication. A bulletin dealing with this disease prepared by Dr. Hilton is published as an appendix hereto.

## ANTHRAX.

As will be seen from the statistics, anthrax has made its appearance in a few districts, none of the outbreaks having, however, been at all serious. The inoculation of exposed herds with the anthrax vaccine now manufactured at the laboratory of this branch seems to have been attended with most gratifying results. Owing to the insidious nature of the disease, however, and the modes of infection, it is advisable to inoculate at least once a year the animals on farms where it has at any time made its appearance.

The anthrax vaccine, as also that for the prevention of black-quarter, which are both prepared at the laboratory of the branch, are now supplied to stock owners at a nominal price of five cents per dose. But little of the former is required, I am glad to say, the latter, however, being in constant request. The communications received from persons using these preparations indicate that both are effective preventive agents.

## RED WATER.

The resignation of Professor Bowhill, who had been entrusted with the investigation into the nature and cause of the Red Water among cattle, which has ever since the country was first settled, caused much loss and annoyance to owners in various parts of British Columbia, unfortunately interrupted the work of the branch in this direction. The task has now been assigned to Dr. Seymour Hadwen, First Assistant Pathologist, who has lately returned to the service, after spending considerable time in investigating diseases of this character in collaboration with Professor Nuttall, of Cambridge University. The information contained in this officer's interim report is of such a nature as to encourage the hope that it will in the near future be possible for cattle owners to successfully adopt preventive measures.

## SWAMP FEVER.

The department was fortunate in being able during the winter just past to induce Dr. J. L. Todd, professor of pathology at McGill University, to undertake a special investigation into the nature and cause of the peculiar disease known as 'Swamp Fever,' to which is attributable serious mortality among horses in various low lying districts in the prairie provinces.

Through the kindness of the authorities at Macdonald College, accommodation was furnished there for the experimental animals required.



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The report of Professor Todd is not yet to hand, but his established reputation and long experience in work of this class renders it more than probable that he will be able to throw much needed light on the nature of this hitherto obscure disease.

### TUBERCULOSIS.

The policy of this branch in regard to bovine tuberculosis, since the time I assumed office, has, for various reasons, which need not now be further discussed, been of the most conservative character. It is evident, however, that it will, in the near future, be necessary to take some definite action with a view to bringing this treacherous and widespread malady under effective control. The fact that, although many attempts have been made, no country has, as yet, been able to formulate a practical and successful policy with this object in view is, of course, very discouraging, but I am inclined to think that public opinion has now reached such a point as to render definite official action not only advisable but absolutely necessary.

The position of Canada in this matter is no worse, and, in fact, is somewhat better than that of many communities which have hitherto tried to solve the problem, inasmuch as of the many attempts at legislation which have been made in different countries, the majority have utterly failed of their object, while in the others the benefits derived have been less of a practical than of an educational nature.

The disease exists to a greater or less extent among the cattle of Canada, particularly among those kept under highly artificial conditions, and the returns of the Meat Inspection Division also indicate its prevalence among swine, especially in districts where these animals are closely associated with cattle or fed on the by-products of the dairy. If, however, the cattle of the country were once free from the disease, our swine would immediately share in the immunity, as in them it is almost invariably of bovine origin.

At the annual meeting of the American Veterinary Medical Association, which was held in Chicago in August, an International Commission on the Control of Bovine Tuberculosis was created, on the understanding that the movement would receive the moral, and, to some extent, the financial support, of the governments of the United States and Canada, as also of the various state and provincial governments and other bodies interested in the subject. This commission, of which I have the honour to be chairman, is composed of the following gentlemen, all of whom have, though in some cases very widely differing view points, studied long and carefully the great problem of the control of bovine tuberculosis:—

Hon. W. D. Hoard, Ft. Atkinson, Wisconsin, U.S.A.

Dr. J. R. Mohler, Washington, D.C.

Dr. V. A. Moore, Ithaca, N.Y.

Dr. M. P. Ravenel, Madison, Wis.

Dr. E. C. Schroeder, Washington, D.C.

Hon. W. C. Edwards, Ottawa, Canada.

Mr. J. W. Flavelle, Toronto, Canada.

Dr. C. A. Hodgetts, Ottawa, Canada.

Dr. F. Torrance, Winnipeg, Canada.

Mr. T. W. Tomlinson, Denver, Col.

Dr. Hurty, Indianapolis, Ind.

Mr. P. Cudahy, Chicago, Ill.

Dr. H. R. Reynolds, St. Paul, Minn., secretary.

It will be noted that among them are representatives of the dairy, stock breeding, and packing industries; that the veterinarians are of different varieties, some being engaged in scientific research, while others are occupied in practice or in veterinary sanitary work. It will be observed that there are also two public health officers, representing respectively Canada and the United States.



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This commission has already held two meetings during the year. The first of these took place at Buffalo, N.Y., December 13 and 14, 1909, and the second at Detroit, Mich., on March 1 and 2, 1910.

It is too early as yet to speak with any great certainty as to the official outcome of its deliberations, but it is reasonable to hope that a body constituted as is this commission will be able to formulate such a policy as, while sound, practical and conservative, will enable us to make some forward movement against bovine tuberculosis instead of marking time as we have until now been doing.

## STAFF.

Several minor changes have been made in the personnel of the staff during the past year, the resignation of Professor Bowhill, F.R.C.V.S., who had for some time been engaged in investigating red water among cattle in British Columbia, being regretfully accepted. Speaking generally, the locations of the various officers are practically the same, allowance being made, of course, for the additions rendered necessary by the extension of the work of the branches.

Dr. J. A. Couture, Superintendent of the Animals' Quarantine Station at Point Levis, was, in the month of August, also appointed the representative of the Live Stock Branch in the Province of Quebec. Owing to Dr. Couture's long and faithful service on behalf of the various French Canadian Stock Breeders' Associations, and the regard in which he is held by their members, this appointment was a very popular one, and there is no doubt that much benefit will accrue to the department from the new connection thus created.

Mr. W. H. McNish was added to the staff of inspectors engaged in the Live Stock Branch in carrying on the work of the Record of Performance.

Early in the year it was found necessary to place Inspector E. A. Bruce, V.S., Travelling Inspector in the Meat Inspection Division, in charge of an establishment in western Canada, R. E. Murray, V.S., being appointed Travelling Inspector in his stead.

Owing to the death of Mr. F. E. N. Boulter, Inspector of Canneries, which I regret to report occurred early in the year, and later the resignation of Mr. R. Bowlby, who had been employed in a similar capacity, it was found necessary to appoint two new Inspectors of Canneries, Mr. W. J. Flynn, and Mr. C. S. McGillivray being engaged.

Several lay inspectors were also appointed during the year, while the following veterinarians were added to the Meat Inspection staff:—

Belanger, A. A., M.V.  
Bishop, F. C., V.S.  
Cook, R. H., V.S.  
Guy, J. O., M.V.  
Harrison, J. R. N., V.S.  
Macfarlane, T. W. R., V.S.  
MacMillan, D., V.S.  
Moon, W. J., V.S.  
Marriott, W. H., V.S.  
Pomfret, H., V.S.  
Pringle, J. H., M.R.C.V.S.  
Reid, N. W., M.V.  
Townsend, Geo., D.V.S.  
Wingate, F. L., V.S.

My own time during the past year has been, as usual, very fully occupied. Owing to the illness of Dr. Hilton, which, beginning in June, continued for the greater part of the year, it was possible for me to leave Ottawa only for very brief periods.



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In August it fell to my lot, in response to an invitation from the Canadian Medical Association, to address that body at its annual meeting in Winnipeg. During the same week I contributed to the Agricultural Section of the British Association, then also in session in Winnipeg, a paper on 'Some Economic Aspects of the Western Cattle Trade.'

In September I attended the meeting of the American Veterinary Medical Association, which was held in Chicago. At this meeting the International Commission on the Control of Bovine Tuberculosis, of which mention has already been made in this report, was created, and later it was necessary for me, as chairman of this commission, to be present at its meetings held in Buffalo, N.Y., and Detroit, Mich.

I also attended the Winter Fairs at Guelph, and Ottawa, and the meetings of the various Breed Associations, which took place in Toronto and Montreal during the month of February, my attendance being also necessary at the annual meeting of the National Live Stock Record Board and several meetings of the Record Committee. I was also present at the annual meeting of the Ontario Veterinary Association and at the closing exercises of the Ontario Veterinary College.

With reference to this institution, I may add that, with your approval, two members of the departmental staff, Drs. Pringle and Walker, have been, with a view to the effective training of veterinarians for official work, authorized to deliver courses of lectures at the college, the subjects with which they deal being those of most importance to the department.

#### QUARANTINE.

The extension of the quarantine stations at points on the International boundary has been rendered necessary by the present policy of closely inspecting all live stock entering Canada, and especially that of submitting horses from the United States to the mallein test. At many points, especially at those where intending settlers enter in the greatest numbers, largely increased accommodation has been furnished. It is, however, a matter of no little difficulty to secure the effective guarding of the boundary, particularly in the prairie country, although there is reason to hope that, with the co-operation of the other departments interested, it will shortly be possible to considerably improve existing arrangements.

#### STOCK CARS AND YARDS.

I am pleased to be able to report the adoption of a comprehensive policy in connection with the thorough cleansing and disinfection of all railway cars used for the conveyance of live stock in the Dominion.

The great extent of the country to be covered and the widely varying conditions to be met, rendered it a matter of considerable difficulty to perfect the arrangements necessary to securing the object in view. Repeated consultations with the various railway authorities led to an understanding by which all empty stock cars entering principal railway centres in the Dominion are cleansed and disinfected under the supervision of special inspectors. This arrangement having been found to work satisfactorily its provisions were rendered effective by embodying them in a ministerial order, the enforcement of which is now compulsory.

It is also the duty of the officers of the branch to see that the various stock yards, as well as the principal cattle markets throughout the Dominion are maintained in a clean, comfortable and sanitary condition. Safety from disease infection is, of course, the principal object in view, but it is gratifying to be able to report that shippers of live stock universally appreciate the new conditions, while the reduced suffering and additional comfort of the animals are not to be disregarded.



ANTHRAX.

The following outbreaks were reported and dealt with during the year:—

Province.	Outbreaks.	Animals Quarantined.
Quebec... ..	2	54
Ontario... ..	4	94

In Quebec the two outbreaks were in the Labelle district.

In Ontario outbreaks were dealt with in the districts of Dundas, Grenville, Victoria and Haliburton and Russell respectively.

386 doses of anthrax vaccine were supplied from the Biological Laboratory.

BLACK QUARTER.

13,469 doses of blackleg vaccine were shipped from Ottawa in addition to that sold by druggists throughout the Dominion.

RABIES.

308 premises were quarantined on account of the prevalence of rabies in the adjacent districts, distributed as follows:—

County or District.	Premises Quarantined.
Ontario—	
Brant... ..	9
Durham... ..	7
Elgin... ..	4
Haldimand... ..	5
Huron... ..	18
Halton... ..	1
Hamilton... ..	3
Kent... ..	22
Lambton... ..	1
Middlesex... ..	65
Norfolk... ..	5
Oxford... ..	7
Perth... ..	67
Peel... ..	1
Simcoe... ..	2
Waterloo... ..	23
Wentworth... ..	9
Welland... ..	21
Wellington... ..	10
York... ..	23
Saskatchewan—	
Assiniboia... ..	1
Alberta—	
Red Deer... ..	4



SHEEP SCAB.

In Ontario 98 animals on four premises were found to be affected with sheep scab, involving the quarantine of 228 sheep on 13 premises, distributed as follows:—

County.	Affected.	Quarantined.
Kent.. . . . .	18	18
York.. . . . .	80	210

In British Columbia 24 affected sheep were quarantined on one premises and subsequently released after treatment.

MALADIE DU COIT.

Thirty-seven animals, valued at \$5,130, were slaughtered as being affected with this disease, at a cost of \$3,419.98, distributed as follows:—

<i>Saskatchewan.</i>		
District.	Suspected and quarantined.	Slaughtered.
Prince Albert.. . . . .	1	..
Qu'Appelle.. . . . .	1	..
Regina.. . . . .	1	..
<i>Alberta.</i>		
Lethbridge.. . . . .	4	4
Medicine Hat.. . . . .	68	8
Macleod.. . . . .	1	3
Calgary.. . . . .	98	13
Red Deer.. . . . .	93	9
	—	—
	267	37

Value, \$5,130; compensation, \$3,419.98.

HORSE MANGE.

Province.	Outbreak.	Animals. Affected.	Animals. Quarantined.
New Brunswick.. . . . .	23	31	32
Quebec.. . . . .	71	116	158
Ontario.. . . . .	3	3	4
Manitoba.. . . . .	6	15	22
Saskatchewan.. . . . .	14	64	177
Alberta.. . . . .	35	81	452
British Columbia.. . . . .	11	23	197
	163	333	1,042

8,681 horses and 90 mules were inspected on being presented for shipment from the quarantined area in Alberta and Saskatchewan.

CATTLE MANGE.

In Saskatchewan 37 outbreaks of cattle mange were detected, involving the control of 31,960 cattle, 474 of which were found to be diseased.

In Alberta 146 outbreaks were detected, involving the control of 116,040 cattle, only 1,470 of these, however, were found to be affected.

In British Columbia 58 cattle were quarantined on suspicion and subsequently released.



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22,044 cattle were inspected on being presented for shipment from the quarantined area in Alberta and Saskatchewan.

162,967 cattle were inspected in Winnipeg on arrival from points west thereof, all suspected animals (17) being forbidden export east.

## TUBERCULOSIS.

269 cattle were tested on being imported into Canada, 9 of which reacted, 2 were classed as suspicious and 258 proved healthy.

567 cattle were tested for export, 24 of which reacted and 539 successfully withstood the test, 4 being classed as suspicious.

2,566 cattle were tested by private practitioners with tuberculin supplied by this department, 284 of which reacted, 57 were classed as suspicious and 2,225 proved to be healthy.

With regard to this general testing it must be borne in mind that in many cases the existence of tuberculosis is suspected in a herd before tuberculin is applied for, and the proportion of reactors cannot be cited as that obtained from indiscriminate testing.

All reactors were permanently earmarked by a veterinary inspector in cases where the owner did not voluntarily destroy them.

## HOG CHOLERA.

## ONTARIO.

Twenty outbreaks of hog cholera occurred in Ontario in which 589 hogs, valued at \$5,781, were destroyed in the undermentioned counties at a cost of \$3,853.93 in compensation.

Nineteen premises were also quarantined on suspicion, involving the control of 279 hogs.

One hog, valued at \$12, was also destroyed for purposes of examination, at a cost of \$8, but no evidence of hog cholera was found.

County.	No. of Outbreaks.	Hogs Destroyed.
Russell.. . . . .	15	169
York.. . . . .	1	351
Nipissing.. . . . .	3	63
Halton.. . . . .	1	6
	<hr/>	<hr/>
Total . . . . .	20	589

In Quebec one outbreak of hog cholera occurred in Wright county, in which 12 hogs were destroyed, without compensation. Two premises were also quarantined on suspicion, involving the control of 19 hogs.

## BRITISH COLUMBIA.

Thirty outbreaks occurred on the Pacific coast in which 526 hogs, valued at \$4,856.21, were destroyed, involving an expenditure of \$3,233.72 in compensation.

Two premises were also quarantined on suspicion, 35 hogs being involved.

In the Dominion, therefore, 1,127 hogs were destroyed as diseased, at a cost of \$7,087.65 in compensation.



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## GLANDERS.

## DOMINION.

627	{	8 killed on inspection	}	valued at \$73,030. at a cost of \$48,686.01.
		545 " 1st test		
		70 " 2nd test		
		4 " 3rd test		

285 showed clinical symptoms.

24,330 horses were tested with mallein, of which 619 reacted and were destroyed. Of the 619 reactors, 277 showed clinical symptoms of glanders at or during the test.

184 horses are under control for retest.

Of the above 627 horses slaughtered, 37 were killed without compensation as being diseased when imported into Canada.

*Prince Edward Island.*

One horse was tested and proved to be healthy.

*Nova Scotia.*

40 horses were tested and proved to be healthy.

*New Brunswick.*

104 horses were tested and proved to be healthy.

*Quebec.*

61	{	2 killed on inspection	}	valued at \$7,165.00
		58 " " 1st test		at a cost of \$4,776.58
		1 " " 2nd test		

37 showed clinical symptoms.

540 horses were tested with mallein, of which 59 reacted and were destroyed. Of the 59 reactors 35 showed clinical symptoms of glanders at or during the test.

No horses are under control for retest.

Of the 61 horses slaughtered—

61	{	10 were in the electoral district of Terrebonne.		
		1	"	Rouville.
		9	"	Montcalm.
		2	"	Dorchester.
		13	"	Wright.
		3	"	Bellechasse.
		2	"	Chicoutimi and Saguenay.
		1	"	Quebec East.
		4	"	Quebec.
		4	"	L'Assomption.
		7	"	Nicolet.
		2	"	Shefford.
		1	"	Two Mountains.
		1	"	Joliette.
		1	"	St. Hyacinthe.

*Ontario.*

9	{	8 killed at 1st test	}	valued at \$1,010.
		1 " " 2nd test		
		{at a cost of \$673.32		
		7 showed clinical symptoms of glanders.		



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685 horses were tested with mallein, of which 9 reacted and were destroyed. Of the 9 reactors, 7 showed clinical symptoms of glanders at or during the test.

No horses are under control for retest.

Of the 9 horses slaughtered,

6 were in the electoral district of Thunder Bay and Rainy River.

1       "       "       "       Lennox and Addington.

1       "       "       "       Muskoka.

1       "       "       "       Prescott.

*Manitoba.*

70       { 1 killed on inspection }  
           { 60       "    1st test    } valued at \$8,087.  
           { 8       "    2nd test    } at a cost of \$5,391.27  
           { 1       "    3rd test    }

39 showed clinical symptoms.

4,503 horses were tested with mallein, of which 69 reacted and were destroyed. Of the 69 reactors 38 showed clinical symptoms of glanders at or during the test.

22 horses are under control for retest.

Of the 70 horses slaughtered—

5 were killed in the electoral district of Dauphin.

41       "       "       "       Selkirk.

3       "       "       "       Provencher.

1       "       "       "       Souris.

12       "       "       "       Macdonald.

8       "       "       "       Portage la Prairie.

*Saskatchewan.*

386       { 4 killed on inspection }  
           { 339       "    1st test    } Valued at \$46,219.  
           { 43       "    2nd test    } At a cost of \$30,812.33.

156 showed clinical symptoms.

13,475 horses were tested with mallein, of which 382 reacted and were destroyed. Of the 382 reactors, 152 showed clinical symptoms of glanders at or during the test.

127 horses are under control for retest.

Of the 386 horses slaughtered—

34 were in the electoral district of Battleford.

50       "       "       "       Regina.

75       "       "       "       Moosejaw.

51       "       "       "       Mackenzie.

62       "       "       "       Qu'Appelle.

22       "       "       "       Assiniboia.

18       "       "       "       Saskatoon.

28       "       "       "       Prince Albert.

17       "       "       "       Humboldt.

29       "       "       "       Saltcoats.

*Alberta.*

97       { 1 killed on inspection }  
           { 76       "    1st test    } Valued at \$10,134.  
           { 17       "    2nd    "    } At a cost of \$6,755.85.  
           { 3       "    3rd    "    }

43 showed clinical symptoms.



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3,433 horses were tested with mallein, of which 96 reacted and were destroyed.  
Of the 96 reactors, 42 showed clinical symptoms at or during the test.

35 horses are under control for retest

Of the 97 horses slaughtered—

16 were in the electoral district of Medicine Hat.				
9	"	"	"	Red Deer.
3	"	"	"	Macleod.
59	"	"	"	Strathcona.
4	"	"	"	Calgary.
6	"	"	"	Edmonton.

British Columbia.

4 killed on 1st test; valued at \$415; at a cost of \$276.66.

3 showed clinical symptoms.

1,549 horses were tested with mallein, of which 4 reacted and were destroyed.

Of the 4 reactors 3 showed clinical symptoms of glanders at or during the test.

No horses are under control for retest.

Of the 4 horses slaughtered—

2 were in the electoral district of Kootenay.				
1	"	"	"	Victoria.
1	"	"	"	Yale and Cariboo.

NUMBER OF HEALTHY HORSES TESTED.

(Includes import tests.)

	1st test.	2nd test.	3rd test.	4th test.
Prince Edward Island.. . . .	1	..	..	..
Nova Scotia.. . . . .	40	..	..	..
New Brunswick.. . . . .	104	..	..	..
Quebec.. . . . .	436	42	3	..
Ontario.. . . . .	658	18	..	..
Manitoba.. . . . .	4,156	238	16	2
Saskatchewan.. . . . .	11,582	1,328	51	..
Alberta.. . . . .	2,911	341	44	11
British Columbia.. . . . .	1,498	46	1	..
Total.. . . . .	21,386	2,013	115	13



SESSIONAL PAPER No. 15b

DISEASED IMPORTS, 1909-10.

Port.	Number of horses in infected shipments.	Number of shipments.	Number of horses diseased.	Country of origin.	Action.
St. Stephen, N.B.....	1	1	1	U.S.	Returned.
Sarnia, Ont.....	1	1	1	"	"
Fort Frances.....	2	1	1	"	"
Emerson, Man.....	117	17	22	"	{ 4 destroyed. 18 returned.
Gretna.....	46	10	15	"	Returned.
Bannerman.....	23	5	3	"	{ 1 destroyed. 2 returned.
North Portal, Sask.....	663	125	143	"	{ 25 destroyed. 118 returned.
Wood Mountain.....	27	7	7	"	{ 2 destroyed. 5 returned.
Big Muddy.....	39	7	7	"	Returned.
Willow Creek.....	12	1	2	"	"
Coutts, Alta.....	14	2	5	"	"
Twin Lakes.....	10	3	3	"	"
Gateway, B.C.....	10	2	2	"	"
Rossland .....	10	1	1	"	"
Nelson.....	3	1	2	"	"
Midway.....	2	1	1	"	"
Bridesville.....	14	1	3	"	"
Osoyoos.....	6	2	6	"	"
Huntingdon.....	12	2	3	"	"
Total.....	1,012	190	228	.....	.....

One cow was refused admission from the United States at Rouse's Point, Que., being affected with tuberculosis, one at Rossland and two at Huntingdon, B.C. One horse was also refused admission at Osoyoos, B.C., on account of the suspected existence of dourine.

IMPORT TESTING.

17,916 horses were tested on arrival from the United States and allowed to proceed to their destination.

Entered at	Number.
Charlottetown, P.E.I. . . . .	1
Halifax, N.S. . . . .	15
Sydney. . . . .	1
Yarmouth. . . . .	16
St. John, N.B. . . . .	22
St. Stephens. . . . .	8
Woodstock. . . . .	19
McAdam Jct. . . . .	19
Edmundston. . . . .	5
St. Leonards. . . . .	3
Debec Jct. . . . .	6
Aroostook Jct. . . . .	21
Comins Mills, Que. . . . .	13
Lake Megantic. . . . .	2
Coaticooke. . . . .	2
Beebe Jct. . . . .	42
Sherbrooke. . . . .	74
Highwater. . . . .	23



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Entered at	Number.
Abercorn.. . . . .	11
St. Armand.. . . . .	13
Noyan Jct.. . . . .	6
Lacolle.. . . . .	11
Athclstan.. . . . .	11
St. Agnes de Dundee.. . . . .	9
Cornwall, Ont.. . . . .	9
Prescott.. . . . .	24
Morrisburg.. . . . .	4
Brockville.. . . . .	5
Kingston.. . . . .	3
Cobourg.. . . . .	2
Toronto.. . . . .	5
Niagara.. . . . .	45
Bridgeburg.. . . . .	86
Windsor.. . . . .	176
Sarnia.. . . . .	99
Sault Ste. Marie.. . . . .	8
Fort Frances.. . . . .	115
Rainy River.. . . . .	19
Emerson Man.. . . . .	2,629
Gretna.. . . . .	1,047
Snowflake.. . . . .	60
Bannerman.. . . . .	281
Manitoba General.. . . . .	53
North Portal, Sask.. . . . .	9,464
Marienthal.. . . . .	70
Wood Mountain.. . . . .	205
Big Muddy.. . . . .	130
Willow Creek.. . . . .	315
Saskatchewan General.. . . . .	10
Pendant d'Oreille, Alta.. . . . .	277
Coutts.. . . . .	695
Twin Lakes.. . . . .	182
Alberta General.. . . . .	14
Gateway, B.C.. . . . .	72
Kingsgate.. . . . .	693
Rossland.. . . . .	25
Nelson.. . . . .	22
Grand Forks.. . . . .	58
Midway.. . . . .	15
Myncaster.. . . . .	15
Rykerts.. . . . .	34
Osoyoos.. . . . .	128
Bridesville.. . . . .	59
Huntingdon.. . . . .	194
Keremeos.. . . . .	48
White Rock.. . . . .	44
Vancouver.. . . . .	40
Victoria.. . . . .	84
Total.. . . . .	17,916



## SESSIONAL PAPER No. 15b

## IMPORT INSPECTIONS FROM EUROPE FROM APRIL 1, 1909, TO MARCH 31, 1910.

	Horses.	Cattle.	Sheep.	Swine.	Yak.
Halifax, N.S.....	44	.....	2	1	.....
St. John, N.B.....	371	.....	50	3	6
Quebec, Que.....	8	217	3,332	11	.....
Rouse's Point, Que.....	15	2	.....	.....	.....
Montreal, Que.....	1,636	.....	.....	.....	.....
Bridgeburg, Ont.....	3	.....	.....	.....	.....
Victoria, B C.....	.....	.....	1	.....	.....
Total...—.....	2,077	219	3,385	15	6

## PURE BRED IMPORTS FOR THE YEAR ENDING, MARCH 31, 1910.

## HORSES AND ASSES.

Breed.	Great Britain.	United States.	Elsewhere.	Total.
Clydesdale .....	1,033	23	.....	1,056
Shetland. ....	374	.....	.....	374
Percheron.....	39	147	17	203
Shire.....	105	4	.....	109
Hackney.....	94	2	.....	96
Thoroughbred.....	5	68	.....	73
Standard Bred.....	.....	42	.....	42
Suffolk.....	32	.....	.....	32
Belgian.....	6	24	.....	30
Hunter.....	17	.....	.....	17
Welsh Pony.....	8	.....	.....	8
German Coach.....	.....	4	.....	4
French Coach.....	.....	4	.....	4
Morgan.....	.....	4	.....	4
Donkey.....	3	.....	.....	3
Polo Pony.....	3	.....	.....	3
French Draft.....	.....	2	.....	2
Total.....	1,719	324	17	2,060



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PURE BRED IMPORTS FOR THE YEAR ENDING MARCH 31, 1910.  
CATTLE.

Breed.	Great Britain.	United States.	Total.
Jersey.....	92	22	114
Holstein.....		98	98
Guernsey.....	51	13	64
Ayrshire.....	62	2	64
Hereford.....	2	47	49
Red Polled.....		22	22
Shorthorn.....	12	4	16
Angus.....		4	4
Total.....	219	212	431

PURE BRED IMPORTS FOR THE YEAR ENDING, MARCH 31, 1910. ,  
SHEEP.

Breed.	Great Britain.	United States.	Elsewhere.	Total.
Hampshire.....	1,552	1		1,553
Shropshire.....	923	7		930
Cotswold.....	202			202
Oxford.....	199	1		200
Dorset.....	196	3		199
Lincoln.....	154		1	155
Southdown.....	65			65
Dartmoor.....	55			55
Leicester.....	24			24
Romney Marsh.....	3		13	16
Cheviot.....	6			6
Merino.....		4		4
Suffolk.....	4			4
Kerry Hills.....	2			2
Total.....	3,385	16	14	3,415

PURE BRED IMPORTS FOR THE YEAR ENDING, MARCH 31, 1910. ,  
SWINE.

Breed.	Great Britain.	United States.	Total.
Duroc Jersey.....		17	17
Hampshire.....		11	11
Chester White.....		9	9
Berkshire.....	5	3	8
Yorkshire.....	3	3	6
Lincoln.....	5		5
Tamworth.....	2		2
Total.....	15	43	58

GOATS.

Angora.....		2	2
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## SESSIONAL PAPER No. 15b

IMPORT INSPECTIONS FROM UNITED STATES AND NEWFOUNDLAND FROM APRIL 1, 1909, TO  
MARCH 31, 1910.

	Horses.	Mules.	Cattle.	Sheep.	Swine.	Goats.
Charlottetown, P.E.I.....	1					
aHalifax, N.S.....	19			23		3
Sydney.....	78				1	
Yarmouth.....	20			4		
St. John, N.B.....	30		3		7	5
St. Stephens.....	20		1			
Woodstock.....	26					
McAdam Junction.....	42		5			1
Edmundston.....	5					
St. Leonards.....	3					
Debec Junction.....	8		2			
Aroostock Junction.....	22	2				
New Brunswick, general.....	2					
Comins Mills, Que.....	18		1			
Lake Megantic.....	3					
Coaticook.....	2					
Stanstead.....	56		22			
Sherbrooke.....	133	4	39	12	2	
Mansonville.....	96					
Abercorn.....	11		7			
St. Armand.....	49	2				
Noyan Junction.....	45	2				
Rouses Point.....	179	3	5		1	2
bSt. Johns.....	315	24				1
Montreal.....	2					
cAthelstan.....	40	3	28	1		
St. Agnes de Dundee.....	46		232			
Cornwall, Ont.....	12		3			
Kingston.....	18		4			
Prescott.....	165	1	8			
Morrisburg.....	4					
Brockville.....	10		27			
Cobourg.....	3					
Toronto.....	5					
Niagara Falls.....	230	5	54	7		9
Bridgeburg.....	1,123	11	12		9	
dWindsor.....	652	2	25	19	12	9
eSarnia.....	739	9	34	213	11	1
Sault Ste. Marie.....	17	1	5	2		
Rainy River.....	18		31			
Fort Frances.....	184	2	12			
Emerson, Man.....	4,086	564	1,222	304	1	7
Gretna.....	1,312	492	441	54		
Bannerman.....	864	18	178	8		
Snowflake.....	66	1	21			
Manitoba general.....	53		70			
North Portal, Sask.....	13,146	871	6,801	85	26	14
Wood Mountain.....	496	4	331			
Big Muddy.....	405	13	27			
Willow Creek.....	373		360			
Marienthal.....	88	2	20			1
Saskatchewan, general.....	9					
Pendant d'Oreille, Alta.....	287					
fCoutts.....	1,140	20	138	1,908		1
Twin Lakes.....	814	3				
Alberta, general.....	7					
Gateway, B.C.....	67	4				5
Kingsgate.....	954	57	116	2,208		245
Rosslund.....	28		129	443		
Nelson.....	52	6	159	50		19
Rykerts.....	37					
Grand Forks.....	76		90	141	2	
Midway.....	17		52			
Myncaster.....	22		8	1,130		
Keremeos.....	49		12	627		

a1 Ass.    b6 Buffalo.    c4 Camels.    d5Elk, 1 Burro.    e3 Zebra, 3yak, 22 camels.  
f218 Buffalo.



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IMPORT INSPECTIONS FROM UNITED STATES AND NEWFOUNDLAND FROM APRIL 1, 1909, TO  
MARCH 31, 1910—*Continued.*

	Horses.	Mules.	Cattles.	Sheep.	Swine.	Goats.
Bridestville.....	62		8	794		
Osoyoos .....	247	2	4	2,481		
Huntingdon.....	334	4	198	27		1
New Westminster.....			12	1,931		
White Rock.....	843	8	70	1,899		3
Vancouver.....	176	1	1	17,241		
Victoria.....	417	16	5	5,641		1
Nanaimo .....		49				
White Horse.....	54		1,333	560		
Total.....	31,032	2,206	12,366	37,813	72	328

## ANIMALS INSPECTED FOR EXPORT FROM APRIL 1, 1909, TO MARCH 31, 1910.....

	Horses.	Mules.	Cattle.	Sheep.	Swine.
Halifax to Great Britain.....	1		116		
St. John to Great Britain .....	34		9,088		
Montreal to Great Britain.....	84		96,639	1,405	
Inspected at Montreal for shipment to Great Britain via. Boston and Portland.....			14,547		
Toronto to Great Britain. ....			38,494	1,346	
Niagara Falls to Great Britain.....			154		
Bridgeburg to Great Britain .....			131		
North Portal to Great Britain .....			428		
Montreal to South Africa.....		202	6	211	
Halifax to South Africa.....				2	
Toronto to West Indies. ....			356	506	
Halifax to St. Vincent.....			2		6
Halifax to Jamaica.....				283	
Halifax to Bermuda. ....	47		489	382	10
Halifax to Barbados.....	33				
Halifax to Trinidad.....	10			14	
Halifax to St. Kitts and St. Lucia.....	1		1	1	1
Halifax to Demerara.....	1			1	1
Halifax to Turks Island.....				6	
Halifax to Newfoundland.....	2		2		
Sydney to Newfoundland.....	174		662	26	2
Charlottetown to Newfoundland....	24		1,793	1,948	20
Bayfield and Mulgrave to Newfoundland.....	86		858	519	
Halifax to St. Pierre and Miquelon.....	2		13		3
Sydney to St. Pierre and Miquelon.....			163	245	1
Toronto to United States .....			22	16,860	59
Bridgeburg to United States.....				28,626	
Total.....	499	202	163,964	52,381	94



## SESSIONAL PAPER No. 15b

ANIMALS REJECTED AT THE FOLLOWING PORTS FROM APRIL 1, 1909, TO MARCH 31, 1910.

Port.	Cattle.	Sheep.
Halifax, N.S.....	1	.....
St. John, N.B.....	9	.....
Montreal, Que.....	484	1
Toronto, Ont.....	184	.....
Bridgeburg, Ont.....	19	.....
Total.....	697	1

Of the above, 122 cattle at Montreal, 110 at Toronto and 1 at Halifax were rejected for actinomycosis and one for suspected mange at Montreal. The rest of the animals were suffering from lameness or injuries received during transportation and showed no indication of contagious or infectious disease.

## MEAT INSPECTION.

The results of the constant care and watchfulness bestowed on the Meat Inspection Service ever since its inception, namely three years ago, are beginning to make themselves apparent. The packers and the public generally are rapidly adapting themselves to the new conditions, and, although there is, of course, still much room for improvement, it is gratifying to be able to report that the work is being carried on effectively and without friction.

While unfortunately the limitations of the service prevent its application to establishments other than those engaged in export or interprovincial trade, it has been the means of creating a strong sentiment in favour of the regulation of the slaughter and preparation of meats on the part of various municipal authorities throughout the country. This feeling, which is undoubtedly due almost entirely to the thoroughness of the inspection service of this Branch, is rapidly making itself felt in a number of different communities, and it is probable that in the very near future precautions similar to those insisted on by this Department will become general throughout the country. The condition of affairs which would thus be created is one greatly to be desired not only on account of the great reduction in the danger to human life, which would follow, but also because of the fact that, under existing conditions, the proprietors of establishments under inspection are daily subjected to unfair competition from dealers, who, being free from official supervision, make but few condemnations, and therefore undoubtedly dispose of much diseased and unsound meat.

I am satisfied that once the Canadian public has become seized of the situation, they will insist upon the adoption by the various municipal authorities throughout the country, of a much more thorough system of dealing with butchers, and the meat trade generally, than has hitherto been tolerated.

It does not appear to me that there is any need or likelihood of conflict.

We are setting a fairly high standard, and all that is required is for the municipal authorities to adopt, under the legislation now existing, regulations somewhat similar to ours, with the view of rendering unmarketable, diseased or otherwise unsound meats, which, under present conditions, cannot enter establishments engaged in export or interprovincial trade.

The first and most important step in this direction will, it is needless to say, be the providing of public abattoirs, to be conducted under inspection methods similar



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to those required by the Meat and Canned Foods Act, especially as regards the admission either of live animals or their carcasses.

The sooner the private slaughter house is abolished altogether, the better for all concerned, as most of the objectionable meats placed on the market emanate from these undesirable and unsanitary places.

The trade in home-killed dressed carcasses will also, for similar reasons, gradually be wiped out of existence, and although the abolition of this form of meat disposal will probably cause some temporary dissatisfaction among farmers, matters will soon adjust themselves, and the profits to the producer will be in no way lessened, although the livers and other offal hitherto utilized by the household will be no longer available.

The municipal abattoir is a modern necessity, and must come.

There are many among us, not yet old, who can well recollect when the number of hospitals in Canada could almost be counted on the fingers, and when a proposal to erect an institution of this kind in a small town was looked upon as indicating a mild form of insanity.

How many of the communities now possessing modern and up-to-date hospitals would be satisfied to do without them?

The same will be found true of the abattoir, and if no other argument could be advanced in favour of the Meat and Canned Foods Act than the fact that it has aroused and is arousing public opinion on the great and important question of a sanitary meat supply, this would, in my opinion, fully justify its being placed on the statute books.

I am glad to be able to report that during the year just passed there has been a decided improvement in the conditions attending the packing of fruits and vegetables. This improvement may be credited almost entirely to the supervision of those officers of the Branch who are responsible for the inspection of the establishments engaged in this industry. Without going into details, it may be frankly stated that in many of these places the need for official supervision was very evident, although in others, the conditions were not at all discreditable.

The various establishments engaged in the preparation and sale of condensed and preserved milk and cream have also been receiving considerable attention at the hands of our inspection staff. In all these different lines a gradual, but marked, improvement is taking place, and it is hoped that within the near future the Department will be able to vouch for any Canadian product, the preparation of which is dealt with under the provisions of the Meat and Canned Foods Act.



## SESSIONAL PAPER No. 15b

## ESTABLISHMENTS under Inspection, March 31, 1910.

No.	Name.	Place.	Inspectors.
1	Fowler's Canadian Co., Ltd.....	Hamilton.....	T. M. Pine, V.S. A. C. Ramsay, V.S. J. Edgecombe.
2a	George Matthews Co., Ltd.....	Hull, P.Q.....	H. H. Ross, V.S. W. H. Marriott, V.S. J. Terrance.
2b	Geo. Mathews Co., Ltd.....	Brantford.....	W. Kime, V.S.
26c	Geo. Matthews Co., Ltd.....	Peterborough.....	W. A. Henderson, V.S. W. J. Moon, V.S.
25	Montreal Abattoir Co.....	Montreal.....	F. H. S. Lowrey, V.S. R. D. Orr, V.S. E. G. Lemieux, M.V. J. R. Young. W. H. Pethick, V.S.
4b	Davies, Limited.....	Montreal.....	J. W. Porter, V.S. W. H. James, V.S. H. Mizener.
5	Laing Packing & Provision Co ..	Montreal.....	J. W. Symes, V.S. F. A. Walsh, V.S. H. Macey.
22	Montreal Union Abattoir.....	Montreal.....	L. J. Demers, M.D., M.V. C. E. Derome, M.V. N. W. Reid, M.V. A. J. G. Hood, M.V. J. Briere.
24	Wm. Clark.....	Montreal.....	A. W. Beach, V.S.
25	N. K. Fairbanks Co.....	Montreal.....	C. D. Bancroft, D.V.S.
4a	Wm. Davies Co., Ltd.....	Toronto .....	J. H. George, V.S. J. E. Morse, V.S. A. A. Belanger, M.V. M. W. Everett.
6	Park Blackwell Co.....	Toronto .....	A. R. Torrie, V.S. D. R. Bone, V.S.
7	Harris Abattoir Co.....	Toronto .....	A. C. Walker, V.S. D. A. Irvine, V.S. J. R. Thompson, V.S. T. W. R. Macfarlane, V.S. Dennis Brown.
28	W. Wight & Co.....	Toronto .....	J. B. White, V.S.
8	D. B. Martin Co.....	West Toronto.....	F. Fisher, V.S. W. A. Hodgins.
9	Gunns Limited .....	West Toronto.....	J. A. McLeish, V.S. F. L. Wingate, V.S.
4c	Davies Packing Co.....	Harriston.....	C. J. Johannes, V.S.
10	F. W. Fearman Co., Ltd.....	Hamilton.....	S. Ransom, V.S. W. A. Morrin, D.V.S.
11	Ingersoll Packing Co.....	Ingersoll.....	T. H. Richards, V.S. E. R. Farewell, V.S.
13	Whyte Packing Co.....	Stratford.....	C. E. Edgett, V.S.
14	Collingwood Packing Co.....	Collingwood.....	W. R. Bell, V.S.
16	Wm. Ryan, Co....	Fergus.....	G. C. Brownridge, V.S.



ESTABLISHMENTS under Inspection. March 31, 1910—Continued.

Na.	Name.	Place.	Inspectors.
27	Tillsonburg Packing Co.....	Tillsonburg.....	W. Lawson, V.S.
18	J. Y. Griffin Co.....	Winnipeg.....	A. R. Walsh, V.S. F. C. Bishop, V.S.
19	Gordon, Ironsides & Fares.....	Winnipeg.....	J. D. Ross, V.S. J. R. English, V S.
20	Gallagher, Holman & Lafrance....	Winnipeg.....	A. E. Cameron, V.S. A. Hobbs, V.S. H. Pomfret, V.S.
21	Western Packing Co.....	Winnipeg.....	F. .C Jones, V.S. I. Christian, V.S.
23	P. Burns Company.....	Calgary. ....	E. A. Bruce, V.S. M. Barker, V.S. T. G. McClelland.
18b	J. Y. Griffin & Co.....	Edmonton.....	J. H. Shonyo, V.S. C. W. J. Haworth, V.S.
33	Dominion Meat Co. ....	Calgary. ....	C. Maconachie, V.S.

		Name.
Chief, Meat Inspection Division.....		R. Barnes, V.S.
Travelling Inspector.....		R. E. Murray, V.S.
In charge of Montreal. ....		M. J. Kellam, V.S.
In charge of Toronto.....		L. A. Willson, V.S.
In charge of Winnipeg.....		C. D. McGilvray, M.D.V.
Special duty in Prince Edward Island.....		A. R. Douglas, D,V.S. Geo. Townsend, D.V.S.
Leave of absence.....		J. C. Reid, M.V. B. A. Bescoby, V.S.
Inspectors of Canning Factories.....		J. H. Pringle, M.R.C.V.S. W. J. Flynn. C. S. McGillivray.



## SESSIONAL PAPER No. 15b

## DISEASES FOUND ON POST MORTEM INSPECTION APRIL 1, 1909—MARCH 31, 1910.

Disease.	Cattle.			Sheep.			Swine.			Poul-try.
	Car-cases.	Por-tions.	Lbs.	Car-cases.	Por-tions.	Lbs.	Car-cases.	Por-tions.	Lbs.	Lbs.
Adhesions.....		959			290			679		
Abscess.....	6	17,874	69	56	95		8	992	174	
Actinomycesis.....	15	5,886					1	356	642	
Atrophy.....		14								
Bruises.....	205	6,640	621	31	408	63	20	1,671	5,672	
Burnt.....									30	
Cripples.....	34	72	49	11	14		31	2,735	2,733	
Cysts.....		8						17		
Congestion.....								150		
Cancer.....							1			
Cysticercus Bovis..	154									
Cysticercus Cellulosae.....							179			
Cysticercus Tenuicollis.....					24			19		
Decomposition.....										558
Discoloration.....		1								
Dying Condition...	3									
Dirty.....			270							
Dysentery.....	1									
Emaciation.....	58			111			12			
Enteritis.....	8			3			47			
Emphysema.....								292		
Hernia.....		2					4	34		
Hydremic Cachexia.....	8			14						
Immaturity.....	2,028			1						
Improper Bleeding	6			34			8			
Induration.....					4			24		
Jaundice.....	10			6			7			
Metritis.....	10			2			13			
Mucoid Degeneration....	36									
Mammitis.....							5			
Necrosis.....		327		1	1,003		1	7,271		
Parasites.....		30,876		3	20,134	35	3	6,830		
Pericarditis.....	24			1			2			
Peritonitis.....	13			9			37			
Pleuritis.....	14			6			36			
Pneumonia.....	74			21			101			
Pyemia.....	111			41			181			
Pregnancy.....				1						
Renal Calculus.....		3								
Sexual Smell.....							165			
Skin Diseases.....							14	51		
Sarcoma.....	3									
Synovitis.....		1								
Sour.....	2		59,484	1		4,439	1		96,160	
Tuberculosis.....	1,697	11,327		2	287		1,788	206,442		
Tumour.....	6	66		1	3		4	161		
Various.....	12	123		20	17		41	242		
Total.....	4,538	74,189	60,493	376	22,279	4,537	2,710	227,066	105,411	558
Found Dead.....	69			152			696			
Total.....	4,607	74,189	60,493	528	22,279	4,537	3,406	227,966	105,411	558



SUMMARY.

April 1, 1909, to March 31, 1910.

Total number of cattle slaughtered .. . . .	384,789
Carcases of cattle 'condemned'.. . . .	4,538
Percentage of cattle 'condemned'.. . . .	1.17
Portions of cattle 'condemned'.. . . .	74,189
Total number of sheep slaughtered.. . . .	257,649
Carcases of sheep 'condemned'.. . . .	376
Percentage of sheep 'condemned'.. . . .	.15
Portions of sheep 'condemned'.. . . .	22,279
Total number of swine slaughtered.. . . .	1,261,496
Carcases of swine 'condemned'.. . . .	2,710
Percentage of swine 'condemned'.. . . .	.22
Portions of swine 'condemned'.. . . .	227,966
Total number of animals slaughtered.. . . .	1,903,334
Total number of carcasses 'condemned'.. . . .	7,624
Total number of portions 'condemned'.. . . .	324,434
Percentage of carcasses 'condemned'.. . . .	.40

During the course of re-inspection, the following meats were condemned:—

	Cattle.	Swine.	Sheep.	Poultry.
	Lbs.	Lbs.	Lbs.	Lbs.
Sour.....	59,484	96,160	4,439	.....
Decomposed.....				558
Dirty.....	270			:
	59,754	96,160	4,439	558

Total amount condemned on re-inspection 160,911 pounds.

A COMPARISON of Animals Slaughtered at Establishments under Inspection, during the years 1908-1909 and 1909-1910.

Cattle killed—	
1909-1910.. . . .	384,789
1908-1909.. . . .	298,241
Increase.. . . .	86,548
Sheep—	
1909-1910.. . . .	257,049
1908-1909.. . . .	191,792
Increase.. . . .	65,257
Swine—	
1909-1910.. . . .	1,261,496
1908-1909.. . . .	1,532,796
Decrease.. . . .	271,300



## LIVE STOCK BRANCH.

### SHEEP INDUSTRY.

In the work of the Live Stock Branch perhaps more attention has been paid during the year just past to the development of the sheep industry than to any other question with which this branch is called upon to deal.

During the last ten years the number of sheep in the Dominion has been steadily diminishing in spite of the fact that other classes of farm stock, while not showing any inordinate increase, have maintained their numbers in reasonable proportion to the general growth and prosperity of the country.

This falling off in the number of sheep kept has been the subject of much concern to those most interested in this class of live stock, and many different opinions as to the cause, or causes, responsible for this condition have been advanced both in the agricultural press and in the meetings of the various sheep breeders' associations.

Among the causes most frequently mentioned may be cited the continued low price of wool, the prevalence of dogs in eastern Canada, and of wild, sheep-killing animals in the west, the irregularity of mutton prices, due to alleged combinations among dealers, and the increased attention paid to dairying and other special lines of husbandry.

While probably all of these conditions are responsible to a greater or less extent for the falling off above referred to, I cannot refrain from expressing the opinion that the principal reason for the retrogression is unquestionably the fact that our Ontario breeders of pure-bred sheep, having succeeded in finding a profitable market, especially for their lambs, in the United States, have paid practically no attention to the development of sheep farming in Canada. As a consequence of this, flock masters in many districts have either, owing to indifference, or lack of information, used the services of common grade rams, only too frequently of their own breeding. This has led to a deterioration in quality as regards both mutton and wool, followed naturally by a lessening of profits, and a consequent reduction in size, as well as in the number of grade flocks.

The benefits resulting from the sales of pure-bred rams, which were held in Nova Scotia and Prince Edward Island during the fall of 1908, were so evident that it was resolved, with your approval, to continue the work in 1909, at the same time extending it to some other parts of the Dominion. With the co-operation of breeders of pure-bred flocks a series of sales was accordingly held during the autumn of 1909. Three sales were held on the Ontario side of the Upper Ottawa Valley, three being also held on the Quebec side, the country adjacent to the river in both provinces being admirably adapted for sheep farming, although the class of sheep hitherto produced has been very inferior in character.

Ten sales were held in the central and eastern portions of the province of Quebec, while three took place in Prince Edward Island. One car load of the various breeds was sold by auction in British Columbia. In all, four hundred pure-bred sheep, the great majority of which were males, were placed within easy reach of farmers wishing to improve their flocks. These sheep were supplied by breeders who received the exact price at which their various entries were sold, the expenses of the transportation, feed and care of the animals, as well as the expenses of selling being defrayed by this branch.

It was last year much easier than usual to secure sheep in this way because of the quarantine of thirty days imposed in June, 1908, by the United States authorities



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on Canadian breeding sheep entering that country, which led to large numbers of good rams being left on hand. Had these breeders in past years devoted more attention to the upbuilding of a Canadian market for pure-bred stock, this action on the part of the United States authorities would have injured them but little, whereas under the artificial conditions under which they found themselves many were forced to sell good lambs at butchers' prices.

In the prices obtained at these sales there was a wide variation, not always accounted for by the quality of the stock offered, it being found that in districts where the home flocks were of fair quality, good animals fetched good figures, while in localities where the home flocks were of low quality, even the best sheep offered brought but little more than mutton prices. This circumstance showing, as it does, the benefits resulting from a knowledge of the advantages of keeping good sheep constitutes a valuable object lesson and indicates the benefits which would result if the breeders of pure-bred sheep were to undertake and maintain energetic measures with the object of introducing good blood into communities well suited for sheep raising, but in which the business has never been conducted on intelligent lines.

The holding by the Department of these sales was highly approved both by the breeders and by the farmers purchasing the stock, and I have no hesitation in recommending that, if possible, similar sales should be held during the coming season. The United States quarantine having now been removed, it is to be feared that our breeders will, as usual, dispose of any surplus stock to buyers south of the line, thus still further retarding the development of a Canadian market, proof against the quarantine and customs regulations of any foreign country.

#### FRENCH CANADIAN RECORDS.

The revised French Canadian Stud Book has now been closed, the work of re-inspecting foundation stock having been completed during the year. No animals will now be registered other than the offspring of duly registered stock, and such individual stallions of other breeds as may be specially approved by the association. In this connection it is interesting to note that at the annual meeting of the association held in Montreal in February last it was decided to admit to registration in the French Canadian Stud Book during the next five years stallions of the Thoroughbred, Morgan, Standard-bred and Hackney breeds, on condition that any individual offered for entry should be approved on inspection by a special committee named for the purpose, such committee to include the Live Stock Commissioner of your Department, or such other officer as might be named in his place.

At the St. Hyacinthe Exhibition a special show of French Canadian horses was held, at which a number of excellent animals competed for the prizes given under your authority by the Live Stock Branch. This is the second of these special shows held under the auspices of this Branch the first having taken place at St. Johns, Quebec, in 1908. As before one-half of each award was withheld for one year, to be paid on condition that the winning stallions should be retained in the province of Quebec, and winning mares have been bred to these winning stallions.

#### RECORD OF PERFORMANCE.

Steady progress has been made during the year in what may be termed extension of the work of the Record of Performance. The demands for the services of the officers engaged in this work have increased to such an extent that in addition to the appointment of another regular officer it has been found necessary to make special arrangements for inspectors in some of the more distant provinces. In fact, animals are now undergoing test in every province of the Dominion, except Manitoba and Saskatchewan. A second report embodying the records of cows qualified since July, 1908, was recently issued.



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## EDUCATIONAL WORK.

As usual, a great deal of educational work has been done, not only by the regular officers of the Branch but by many other live stock experts especially engaged for the purpose. In all the provinces, except Ontario, Quebec and Manitoba the Branch has co-operated with the provincial departments of agriculture in arranging for series of meetings addressed by gentlemen specially qualified to deal with live stock subjects. In Quebec, where no special provincial organization for this purpose is in existence, I found it necessary to arrange for the meetings without assistance from the provincial department.

There is great need, as well as ample opportunity, for the intelligent development of agricultural knowledge in the province of Quebec; the people are ready and anxious to absorb information, and it is therefore a subject for regret that the provincial authorities have, so far, failed to realize the importance of creating the organization necessary for its dissemination.

The speakers sent out by this Branch are, as a rule, practical and experienced men capable of imparting much useful knowledge on any phase of animal husbandry. The reports which they are required to furnish at the conclusion of each tour, and which are carefully filed, form a most reliable index of the work done, as well as a useful source of information for the guidance of future operations.

Judging classes are frequently an interesting phase of the various meetings, the demonstrations on live animals by capable judges being most attractive, especially to the younger farmers interested in live stock.

Many expert live stock judges have also been supplied by the Branch during the year for the various fairs throughout the Dominion. This system, which has now been followed for a number of years, consists in placing at the disposal of the Provincial Department of Agriculture, and, in some cases, of various associations, the best available men from every province at a cost not greater than if local judges were employed. In addition to the impartiality of judgment thus secured there is a distinct advantage in having the animals accurately placed in such a way as to impress those interested with the differences in quality between the individuals shown.

The judges sent out by the branch have definite instructions to explain, when asked, their reasons for placing the awards. The intercourse promoted between the stockmen of the various provinces by the visits of these judges, and the interchange of ideas thus brought about have proved of great indirect value in assimilating the views and standards of those who, although widely separated geographically, are interested in the same breeds of stock. Especially in the younger districts also the advice of the experienced men sent out by the Branch is often of great assistance to those engaged not only in organizing fairs and exhibitions, but in the inauguration of other methods of distributing sound agricultural knowledge.

## WINTER FAIRS AND AUCTION SALES.

Financial aid has been continued to winter fairs in the maritime provinces and in the west, as also to provincial auction sales of pure bred stock, when these are conducted in accordance with the conditions imposed by the Department.

## PUBLICATIONS.

Several publications have been issued during the year; among these may be mentioned the special report on the cattle trade in western Canada, in which the various conditions adversely affecting this trade, as at present conducted, are very fully discussed, some suggestions for their improvement being also offered. This report is printed as an appendix hereto.



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A directory of the live stock breeders throughout the Dominion has also been issued, this action being deemed advisable on account of the constant demands for information as to where pure bred animals of the different breeds might be obtained.

The report of the Commission of Canadian Swine Breeders, which, during the summer of 1909, visited Great Britain, Ireland and Denmark to investigate the conditions affecting the industry in this country, has also been published for distribution, its preparation having been entrusted to Mr. J. B. Spencer, of my staff, who accompanied the commission as secretary and editor. The demand for this report, which is a most attractive publication, containing, as it does, a mass of useful and interesting information, has so far exceeded your expectations that it has been necessary to publish a second and larger edition.

While the work of the Live Stock Branch has not, during the year just passed, been distinguished by any sensational features, the ground has been thoroughly covered, while careful preparation has been made for future activity in regard to various matters of vital importance to the live stock interests of the Dominion.

In conclusion I am pleased to be able to report that the arrangement, under which the Health of Animals and Live Stock Branches are operated under one official head, has continued to work very satisfactorily, effort and expense being considerably reduced in the performance of duties common to both Branches.

I have the honour to be,

Sir,

Your obedient servant,

J. G. RUTHERFORD,

*Veterinary Director General and Live Stock Commissioner.*

To the Honourable

The Minister of Agriculture,  
Ottawa, Ont.



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## APPENDIX No. 1.

GEORGE HILTON, V.S.,

CHIEF VETERINARY INSPECTOR.

OTTAWA, March 31, 1910.

SIR,—I have the honour to submit herewith my report for year ending March 31, 1910.

My duties have been confined to your office, with the exception of an official visit to Niagara Falls, Bridgeburg, Windsor, Sarnia and London, and a lengthy absence through illness, extending from June 23, 1909, to January 15, 1910.

I left Ottawa for Manitoba, Saskatchewan and Alberta on March 22 to discuss matters of importance with the inspectors in charge of these provinces,

I have the honour to be,

Your obedient servant,

GEORGE HILTON.

The Veterinary Director General,  
Ottawa.

## APPENDIX No. 2.

R . BARNES, V.S.

CHIEF MEAT INSPECTION DIVISION,

OTTAWA, March 31, 1910.

SIR,—I have the honour to submit my annual report for the year ending March 31, 1910.

In the Meat and Canned Foods Division of your Branch the work has been, generally speaking, most satisfactory. Steady progress has been made in a quiet but effective manner. Your officers stationed in the different establishments throughout the Dominion which come within the operation of the Meat and Canned Foods Act, to whom are entrusted the actual work of inspection and the details inseparable therefrom, have performed their duties in a fair and conscientious manner, provoking little criticism on the part of the managements who have, in most instances, shown a commendable spirit in their evident desire to comply with the requirements of the law.

During the past year a number of new establishments have been placed under inspection, fourteen of which conduct an export business only during the fall and winter months, owing to their not being equipped with modern chilling and cold storage facilities.

The sanitary condition of all the establishments under inspection has been well maintained and many decided improvements have been made.



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The public, though somewhat slow to appreciate the full importance of meat inspection and their safety in purchasing only meat and meat food products which have passed such inspection and which bear the inspection legend, are beginning to give this matter serious thought, and a great number of people are insisting that they be supplied only with such meat.

With the object of demonstrating the value of the work being carried on by this division, exhibits of diseased and condemned as well as healthy and approved meats, were made at Toronto and Ottawa during the annual fairs. A number of officers were in attendance to answer questions regarding the different conditions exhibited, and, judging from the interest shown and the questions asked by the thousands of visitors who daily viewed the exhibits, the result will be an increased demand for healthy meats, slaughtered, handled and prepared under proper sanitary conditions. This demand, I trust, will in the near future be so great that the private and uninspected slaughter-houses, conducted as the majority of them are at the present time, will become an evil of the past.

Meat inspection has demonstrated clearly that tuberculosis exists among our food animals to a far greater extent than was previously known. The percentage of dairy cows, sent to establishments for slaughter, showing evidence of this disease, is such as will warrant serious thought as to possible ways and means for its prevention and possible eradication. Other diseases and conditions found are not numerous, nor of such a nature as to require any special comment.

The amount of bacon and hams exported during the year shows a large decrease. This was naturally to be expected owing to the fact that 271,300 less hogs were slaughtered under inspection than during the previous year, and also to an increased home consumption consequent upon the large number of settlers entering the Dominion. This had the effect of producing a very material increase in the price paid to breeders. In the month of March it reached almost a record price, \$10.75 being paid live weight.

An increased number of other meat food animals were slaughtered, yet a steady high price was maintained throughout the year.

The statistics show a continued decrease in the condemnations for immaturity, a much better class of calves coming forward for slaughter than was the case during the first year of inspection under the Act. The percentage of condemnation for all causes shows little change, the greatest difference being found under tuberculosis.

The vacation granted to the officers of this division as the result of representations made by you to the minister on their behalf, has been greatly appreciated and has had a very beneficial effect on the health of those who were able to take advantage of the privilege. The nature of the work and the conditions which necessarily surround the slaughter of food animals, especially hogs, and the preparation of their carcasses and products, are trying and irksome.

At the examinations held throughout the Dominion, sixty-seven (67) veterinary surgeons presented themselves in order to qualify for positions as inspectors, in accordance with the requirements of the Act. A fair percentage were successful in passing, of whom the majority have been appointed; yet, owing to resignations and dismissals, the staff has not increased to such an extent as might at first appear.

#### FRUIT, VEGETABLES AND MILK.

Early in the year, this division suffered a severe loss by the death of one of its inspectors, Mr. F. E. N. Boulter, whose work was carried on after the appointment of another inspector.

The officers employed in inspection of the many factories engaged in the processing, canning, bottling, evaporating, drying, and otherwise preserving, of fruit, vegetables and milk for food purposes have been selected with care, and on account of the practical knowledge which they possess, acquired by years of close observation and



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contact with the work. As a consequence an improvement is shown in the quality of the products prepared, and in the sanitary conditions under which the operations are conducted. This improvement has been made in a quiet and unostentatious manner, and reflects credit not only upon the officers for the tact and diplomacy with which they have carried out their instructions, but also upon the managements of the different factories for the co-operation and willingness shown by them in their endeavour to carry out the requirements of the Act.

Such establishments as are not yet in the condition desired are, I believe, doing their best to comply with the requirements, but in some cases they are badly handicapped by their situations and surroundings, and, perhaps, lack of finances. I trust, however, that in spite of these inconveniences, the plants mentioned will very soon be brought into such condition as to conform readily to our regulations.

I have the honour to be, sir,

Your obedient servant,

ROBERT BARNES,  
*Chief, Meat Inspection Division.*

## APPENDIX No. 3.

A. E. MOORE, D.V.S.,  
CHIEF TRAVELLING INSPECTOR.

OTTAWA, March 31, 1910.

SIR,—I have the honour to submit herewith my report for the year ending March 31, 1910.

My duties this year as Chief Travelling Inspector have been, as in the past, largely confined to dealing with special cases and to a general supervision of the outside work throughout the eastern provinces.

It is very gratifying to be able to report that, with the exception of rabies in western Ontario, no very serious outbreaks of contagious diseases have occurred in the east during the year.

Glanders appears to be well under control. The local veterinarians and others now recognize the importance of our endeavours to stamp out this dangerous disease, and have reported numerous suspected cases. On investigation a large number of these cases have, fortunately, proved to be due to other diseases.

No glanders was found in the maritime provinces during the year, although several suspected cases were investigated.

A few outbreaks of hog cholera have occurred, especially among hogs in the neighbourhood of cities, and which were fed on uncooked city garbage. 602 hogs were killed on 21 premises, and the compensation paid for them was slightly less than \$4,000.

Three small outbreaks of sheep scab occurred in Western Ontario.

A few cases of anthrax were seen, but the disease was confined to old infected centres.

Mange in horses has been quite prevalent this year, especially in parts of the Eastern Townships of Quebec. In nearly all cases this disease has been spread by horse traders. It was introduced some years ago by bronchos from the west.

The outbreak of rabies in Western Ontario threatened to be a very serious one. Owing to the great distances that rabid dogs sometimes travel during certain stages



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of the disease, it was impossible for our inspectors to effectually trace and deal with the origin of the different outbreaks. Since the muzzling orders have come into force, however, the disease seems to have already somewhat abated.

Hæmorrhagic septicæmia in cattle has again made its appearance. Several quite serious outbreaks occurred in the Eastern Townships of Quebec, and a few cases were seen in Eastern Ontario. Our records show that 74 cattle have died during the year on 15 farms, and there were undoubtedly quite a number of outbreaks which were not reported.

During the year I have visited many of the posts along the international boundary, and have reported from time to time the results of these visits. The following are the posts visited:—Halifax, N.S., St. John, N.B., Québec, Sherbrooke, St. Johns and Lacolle, Que., Cornwall, Brockville, Prescott, Cobourg, Niagara Falls, Windsor and Sarnia, Ont.

#### GLANDERS.

During the year I visited 15 places where glanders was suspected, and tested 36 horses, 4 of which reacted.

21 horses tested in Ontario, 1 was diseased.

11 horses tested in Quebec, 3 were diseased.

4 horses tested in Nova Scotia, none diseased.

The 4 diseased horses were found on three premises. The causes of suspicion on the other 12 premises were nasal gleet, diseased teeth, distemper and purpura hæmorrhagica.

The Ottawa market has been visited nearly every market day during the year, and no cases of glanders have been seen.

From time to time a few cases of glanders have been found in Wright county, Que., near Maniwaki, and, as it was impossible to trace the origin of many of these cases, I considered it important that an investigation be made. Acting on your instructions, therefore, during a slack time I proceeded with Inspector Alf. Dufresne to this district. After some trouble we finally found several cases of glanders; as I was satisfied that there were still other cases, but no actual reports to go by, I considered it advisable to make a house to house inspection of all the horses in this district. I then arranged the work and instructed Inspector Dufresne to carry it out. As a result of this inspection, which took about six weeks, 13 cases of glanders, mostly clinical, involving 6 different premises, and 14 cases of mange belonging to 10 different farmers, were found. This amply paid us for our trouble.

As there were still some doubts as to the prevalence of glanders in the Chicoutimi and Saguenay districts, Quebec, you instructed me to have an investigation made. While in Quebec last fall I arranged with Inspector Gauvin to make a general inspection of the horses in this district, paying special attention to the lumbering concerns and town horses. Dr. Gauvin spent several weeks at this work and examined a great many horses, but no cases of any contagious disease were found.

#### HOG CHOLERA.

In August it was reported that hogs were dying near Ottawa. These hogs were being fed on uncooked city garbage. After a careful investigation, I found the disease to be hog cholera. All the places where this garbage was fed were immediately visited, the hogs carefully inspected and the premises ordered thoroughly cleansed and disinfected, as some of them were in a very unsanitary condition. As a result of this investigation 169 hogs were killed, 54 died; 15 premises being involved.

Owing to our careful watching of the Ottawa outbreak, the disease was noticed in its early stages, which enabled us to allow many hogs to be dressed for food before they became infected, thus saving the Department in compensation.



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When examining this garbage at Ottawa and Toronto, besides finding almost everything in it one could imagine, I found a great many uncooked portions of pork, especially sausages. Whole strings were often found, and in Toronto, frequently a bushel of spoiled sausages would be seen in the garbage from some of the large hotels.

In the Ottawa outbreaks all cases originated in those fed on the city garbage.

In September, in company with Inspector Perdue, I found 351 valuable hogs showing marked symptoms of hog cholera on one farm near Toronto. Fifteen had died previous to our visit. These were also garbage fed hogs.

I also found the disease on a farm near Oakville, Ont. Six hogs were ordered killed and 15 died previous to my visit.

Suspected cases were reported from Guelph, Stamford and near Toronto, which on investigation, I found to be due to other causes, especially exposure and gastric troubles.

## SHEEP SCAB.

During the winter three small outbreaks of scabies were discovered in Western Ontario, all three of which traced back to cull sheep resold from the Toronto market at the time when there was a little scabies in different parts of the province.

In one outbreak near Galt the infection did not spread from the original farm, and the sheep were all slaughtered.

In another outbreak near Ridgetown the infection was traced to one farm, but fortunately the diseased sheep were not in contact with any others in this neighbourhood.

The third outbreak was found in King township, York county; four small flocks were affected, all originating from one source.

All the diseased sheep were immediately twice dipped in lime and sulphur and the premises have been thoroughly cleansed and disinfected.

According to your instructions in May and June, I visited Manitoulin Island in company with Inspector Henderson and arranged to have a general inspection made of all sheep on the island. This work was considered advisable, as for some time it was strongly suspected that the Manitoulin sheep were responsible for some of the outbreaks in other parts of the province, and more especially as the disease was traced to the island from the outbreak of 1905.

Inspector Henderson made a careful inspection of all the sheep, but no further trace of the disease was discovered. From reports of the residents of Manitoulin the disease was never seen there prior to 1905. All the stock yards at the wharves all around the island were thoroughly cleansed and disinfected.

## DIPPING OF SHEEP FOR EXPORT TO THE UNITED STATES.

Acting on your instructions I proceeded to Western Ontario for the purpose of instructing all our salaried Inspectors with reference to the dipping of sheep for trading purposes, which are for export to the United States, this dipping to be done in accordance with the new United States regulations.

## RABIES.

Since the muzzling orders of February 5th came into force, my time has been largely devoted to dealing with rabies in the western peninsula of Ontario. I have personally dealt with a number of outbreaks, and have repeatedly travelled over the territory included in the muzzling order, calling on the veterinarians and municipal authorities in many of the towns and villages. I found that generally the orders were being well enforced, and that hundreds of worthless dogs have been destroyed, which alone will be a great benefit to the country.



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According to your instructions I interviewed the Indian agents and chiefs at the following Indian reserves:—Hagersville, Sutton, Sarnia, Forest and Walpole Island, and fully explained to them the regulations, the kinds of muzzles to be used, and any other information that they desired.

As the Indians are under the direct control of the Dominion government, the agents are responsible for the enforcement of the muzzling orders.

#### TUBERCULOSIS.

I have tested 19 cattle for export to the United States this year belonging to four exporters—reacted and was earmarked.

Testing of herds which have been placed under the supervision of the Branch:—Five herds, comprising 276 cattle were tested by me this year, 3 reacted and 1 was suspicious; the reactors were earmarked.

During the year I earmarked 11 tuberculous cattle which were tested with tuberculin furnished by this Department to local veterinarians.

#### MANGE IN HORSES.

When we were making the general inspection of horses in the Maniwaki district, 14 cases of mange were found on 10 premises. These were ordered treated in the oil and sulphur dip; the treatment was done under our personal supervision, with the result that the two applications cured every case and they were all released in a short time.

I also dealt with two cases in the city of Ottawa, both of which came from the Gatineau district.

#### SUSPECTED DOURINE.

Two years ago a stallion which was imported from France, was being extensively bred to mares at Boucherville, Quebec. Shortly after service many of the mares became affected with a venereal disease and several died. Dr. S. Hadwen examined some of the mares and pronounced the disease coital exanthema. This year it was again reported that some serious disease was prevalent in mares in this neighbourhood, and that many were dying.

According to your instructions I visited Boucherville and made a thorough investigation into this matter. I found the reports greatly exaggerated; the disease was coital exanthema, and deaths were due to complications with influenza, which was prevalent at the time. I examined the stallion and a large number of mares. By all reports exanthema has been in the neighbourhood for some years.

#### ANTHRAX.

Only two small outbreaks of anthrax came to my notice this year; two farms near Guelph, Ont., owners each losing one cow. These two herds were immediately vaccinated, the two carcasses burned and the premises thoroughly disinfected, and no further losses were reported.

The other outbreak was on two adjoining farms near Morrisburg, Ont.; 5 cows died. Both these premises have been infected for some years; the disease is supposed to have come from the State of New York, immediately across the river from Morrisburg, where anthrax has been prevalent for some time.

The carcasses were burned and the stalls thoroughly disinfected and the remaining cattle immediately vaccinated, after which no further losses were reported.

#### BLACK QUARTER.

According to quite an alarming report that some disease was causing the death of cattle near Warkworth, Ont., I visited that place and found the disease to be black



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quarter. According to the local veterinarian and others, this malady has been common in this locality for years. I explained the nature of the disease to the owners and advised vaccination.

## HÆMORRHAGIC SEPTICÆMIA.

In September I visited Sherbrooke and in company with Inspector Whyte visited a farm near North Hatley, Que., where at the time of our visit 13 cattle had died. The symptoms presented and the post mortem lesions confirmed Dr. Whyte's diagnosis.

A few days after this a report was received from Renfrew, Ont., that cattle were dying, supposedly from anthrax. I visited Renfrew and found the disease was due to hæmorrhagic septicæmia. Five cattle died on two adjoining farms. I was informed by the local veterinarian that cattle died on the farms several years ago presenting the same symptoms. During the last of October it was reported that cattle were dying of some unknown disease in the neighbourhood of Sweetsburg, Que. In company with Inspector Whyte I visited Sweetsburg, and we found that the disease was hæmorrhagic septicæmia. At the time of our visit about 35 cattle died on 8 or 9 farms within a radius of  $2\frac{1}{2}$  miles.

In all of the above cases isolation of the cattle and a thorough cleansing and disinfection of the premises were advised.

## INSPECTION OF ANIMALS IMPORTED INTO CANADA FROM THE UNITED STATES.

	Horses.	Mules.	Goat.	Buffalo.	
June 18.. . . .	315	24	1	6	Crossed at Lacolle, Buffalo Bill's show.
July 18.. . . .	1				Crossed at Cobourg, temporary stay.
Jan. 29.. . . .	2				Ottawa, exhibition purposes.

I have the honour to be,

sir,

Your obedient servant,

A. E. MOORE,  
*Chief Travelling Inspector.*

The Veterinary Director General,  
Ottawa, Ont.

## APPENDIX No. 4.

C. D. MCGILVRAY, M.D.V.

WINNIPEG, March 31, 1910.

SIR,—I have the honour to submit herewith report in connection with the Health of Animals, Branch in the province of Manitoba for the year ending March 31, 1910.

The Health of Animals' Branch here comprises three divisions, viz:—

Diseases Control Division.

Quarantine Inspection Division.

Meat Inspection Division.

The work performed by officers in connection therewith consists in carrying out the requirements of the various regulations relating thereto.



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## DISEASES CONTROL DIVISION.

The work in connection with this division consists in dealing with the control and eradication of diseases coming under the Contagious Disass of Animals Act, and the enforcement of the various requirements of the regulations relating thereto, as well also as the investigation of such other diseases and conditions as appear to be of sufficient importance to warrant same.

## GLANDERS.

I am pleased to report that our efforts towards the control and eradication of this disease have met with gratifying success. The past year has been characterized by a very noticeable decrease in the number of outbreaks detected and dealt with, as well also as a marked decrease in the number of animals found to be affected and destroyed. No cases of glanders have been detected in this province now for a preceding period of about six months, although a considerable number of suspected animals have been inspected and tested without any being found to be affected.

During the past year I have inspected and submitted to the mallein test, and destroyed for glanders, the following number of horses:—

Sixty-six submitted to a first mallein test (this number includes 9 in the province of Ontario).

Eleven submitted to a second mallein test.

One submitted to a third mallein test.

Two destroyed as a result of a reaction to a first mallein test.

Two destroyed as a result of a reaction to a second mallein test.

One destroyed as a result of a reaction to a third mallein test.

Out of this total of 5 horses destroyed, 3 showed clinical symptoms.

## IMPORT HORSES TESTED, IN ADDITION TO ABOVE.

Twelve submitted to a first mallein test, at destination.

Nine submitted to a second mallein test, at destination.

Of which number, one reacted and was destroyed without compensation.

## GLANDERS STATISTICS FOR MANITOBA.

Summary showing total number of horses and mules tested and destroyed during year, by the various inspectors here:—

## HORSES AND MULES SUBMITTED TO TEST.

First test, 712; second test, 115; third test, 17; fourth test, 3.

## HORSES AND MULES DESTROYED FOR GLANDERS.

First test, 57; second test, 7; third test, 1; without test, 1; total, 66.

Total compensation allowed, \$5,391.27, being an average of \$81.68 each.

## IMPORT HORSES AND MULES TESTED AT DESTINATION.

First test, 101; second test, 28; third test, 5.

## IMPORT HORSES AND MULES WHICH REACTED TO TEST AT DESTINATION, AND DESTROYED WITHOUT COMPENSATION.

First test, 3; second test, 1.



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## MANGE OF HORSES.

During the past year mange has been detected affecting horses in different parts of the province. Affected and contact horses were placed under quarantine restrictions and owners were instructed as to proper treatment of affected animals as well as cleansing and disinfection of the premises.

The total number of horses inspected and placed under quarantine restrictions for mange by the various officers here during the past year comprised 22, of which 15 showed symptoms of mange. All of these animals were re-inspected from time to time, and have now become cured. At the present time no premises are under quarantine for this disease.

## MANGE OF CATTLE.

Mange has not been detected affecting cattle in this province, except at the stock yards, among cattle coming from what is known as the mange area in the provinces of Saskatchewan and Alberta.

In accordance with the requirements of Ministerial Order No. 39, all cattle originating west of Winnipeg are inspected at the stock yards here, and cattle showing manifestations of mange are detained and allowed to be removed only under certificate for immediate slaughter. Cattle destined for points east of Winnipeg are only allowed to go forward after being carefully inspected and under an Inspector's certificate of health. Yards are cleansed and disinfected from time to time, as exigencies require.

During the past year the following number of cattle were inspected at the Winnipeg stock yards:—

99,842 destined to points east of Winnipeg and intended for export; 63,125 for local consumption, having Winnipeg as destination; total, 162,967.

Of this number 17 were found to be affected with mange.

## CAR INSPECTION.

This is an important phase of our work. All empty stock cars, used in the transportation of live stock entering Winnipeg, unless showing evidence of being recently so treated, are cleansed and disinfected here, under the supervision of an Inspector.

## DOURINE.

This disease has not yet been detected affecting horses in this province, though from time to time, our officers have inspected horses suspected of this disease, but which, upon examination, have proved to be suffering from some benign affection and not dourine.

## TUBERCULOSIS.

Our work in connection with this disease is confined largely to cattle being exported to the United States, and the testing of any herds under the control of the Department.

## TUBERCULOSIS STATISTICS.

## CATTLE INTENDED FOR EXPORT TO THE UNITED STATES.

Eighteen were submitted to a first tuberculin test.

Of this number two reacted to the test and were officially ear-marked and exportation prohibited.



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## CATTLE AT BRANDON EXPERIMENTAL FARM.

Thirty-seven head of cattle were submitted to a first tuberculin test.

One head of cattle was submitted to a second tuberculin test.

All of which proved healthy.

Three hundred and eighty-seven head of cattle were tested in the province by practising veterinarians with tuberculin supplied by the Department, of which 128 reacted, and those not destroyed by the owners were ear-marked in accordance with the regulations by a regular officer of this Branch. Out of this number 324 were dairy cattle in the vicinity of Winnipeg, tested by the veterinarian of the Department of Public Health of the city of Winnipeg.

## RABIES.

During the early part of 1909 an outbreak of rabies was reported affecting animals on the premises of a farmer, near the extreme western boundary of the province. Investigation substantiated the existence of the disease, and brought to light some interesting features. It would appear that during November, 1908, a dog on the premises of this farmer presented symptoms of rabies, and, after biting a number of animals, including horses, cattle and swine, was destroyed. In the course of about three weeks, a calf presented symptoms of rabies, and, in a few days thereafter succumbed. A week later a cow died after presenting manifestations of rabies. Subsequently, six other cattle, which had been bitten by the dog in question, became affected, and, after presenting symptoms of rabies, died therefrom. One horse, which had also been bitten, presented manifestations of rabies and succumbed to the disease. In all, the farmer in question lost on his premises, as a result of rabies, eight cattle, three pigs and one horse.

From information gathered, the period of incubation in the different species of animals would appear to have been extremely variable. In the case of pigs, the average period would be about thirty days. In the case of calves, under six months of age, it averaged from ten to twelve days. In mature cattle it was extremely variable. In the case of the first cow to become affected, the period of incubation was about three weeks, while the last to succumb did so on May 2, 1909, although it had been bitten by the rabid animal on November 29, 1908; the first symptoms were presented about three days prior to death, on or about April 28, so that in this case the period of incubation reached 150 days. The brain of this cow was submitted by me for examination purposes to the Provincial Bacteriologist, Dr. Gordon Bell, who confirmed the existence of rabies by the demonstration of negri bodies and animal inoculation.

In the case of the horse, which was bitten on November 29, 1908, it first presented symptoms on Friday, April 9, and becoming violent, broke its neck. The period of incubation therefore in this case reached 131 days. A portion of the brain material of this horse was forwarded and submitted to the pathologist of the Department for examination and inoculation purposes, and was reported as being positive for rabies, the period of incubation in the control animals (rabbits) being 93 days.

In this connection I think it of interest to append the Pathologist's report:—

· 'OTTAWA, July 15, 1909.

'SIR,—I have the honour to report that two rabbits inoculated with the material taken from the horse suspected of being affected with rabies on the premises of Mr. J——— J———, Sec...., Tp...., R...., on April 13 last, died to-day of rabies. One exhibited symptoms for six hours prior to death, and the other for about three hours, although, in the first instance, food was refused for the first time yesterday (24 hours before symptoms), and, in the latter, for the first time this morning. It will be



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observed that the incubation period in these animals has been 93 days, which, in conjunction with the history of the horse, indicates that the virus was considerably attenuated.

‘CHAS. H. HIGGINS,  
*Pathologist.*’

No other cases were reported or detected, in this neighbourhood, or in any other locality in the province of Manitoba during the past year, and, from information gathered from the owner, I am inclined to the view that the source of infection in the case of the dog, originated in the adjacent province of Saskatchewan, where rabies was reported as then being in existence.

## BLACK-LEG.

This disease is reported from time to time from certain sections of the province, where it appears to be more or less indigenous. When the true nature of the disease is established owners are recommended to resort to protective inoculation of susceptible animals, their removal from infected pastures, and the proper disposal of any carcasses of animals which may have died from the disease. During the past year, we have supplied 322 doses of black-leg vaccine to owners for vaccination purposes.

Owners who resort to protective inoculation of cattle by means of the black-leg vaccine, report very favourably as to the immunity conferred.

In addition to duties in connection with the routine work of the control and eradication of diseases coming under the Contagious Diseases of Animals' Act, our attention has also been devoted, from time to time, to the investigation of other conditions which were deemed of sufficient importance, notably the occurrence of obscure febrile affections of horses, and the prevalence of sub-parotid tumours in cattle in certain districts, the latter of which is specially dealt with in report appended hereto:—

## SUB-PAROTID TUMOURS IN CATTLE.

Circumscribed swellings occurring in the sub-parotid (throat) region in cattle, and familiarly known to cattlemen as ‘wens’ and ‘lumpy jaw,’ are of frequent occurrence here. Such swellings, though sometimes of actinomycotic or tubercular origin, have been observed to frequently arise from some other causes.

During the past season it was my privilege to investigate the occurrence of tumours affecting the throat region of cattle in the Nut Lake district of Saskatchewan, alleged to be actinomycosis. In the course of this investigation several interesting facts were brought to light. It was found that in some districts as high as 75 per cent of the cattle showed tumours in the sub-parotid or throat region. In one herd of 96 cattle, 70 were found to show swellings in this region, and I have since ascertained that similar conditions obtain in other localities.

From information gathered it would appear that such tumours make their appearance in cattle chiefly during the latter part of the winter and in the spring. They appear as circumscribed tumours (swellings) located in the sub-parotid region, affecting one or both sides. Those of small size frequently disappear of their own accord, while those of large size, when opened up and pus contents evacuated, heal up and disappear. If of large size, and left untouched, they frequently remain permanently as firm circumscribed tumours or lumps in the throat region. Sometimes they break externally, suppurate, and thus disappear. More frequently, however, the tendency is to remain as a circumscribed, firm tumour.

Cattle raisers in such districts have noticed these occurrences each year, with frequent regularity, and in disposing of their stock have often to do so at reduced prices, owing to the objection of buyers to the presence of such swellings.



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Affected animals have been treated in many cases with potassium iodide, almost specific in the early stages of actinomycosis, but which, in this condition, has not been productive of affecting a cure. External vesication with various vesicants including proprietary blistering preparations known as 'lump jaw cure,' &c., has also been resorted to, but without beneficial results, and leaves extensive blemishes.

Operation upon affected animals reveals the lesion as a firm circumscribed tumour, in diameter from two to six inches with a dense fibrous capsule, having a cavity containing pus. Examination of the pus with a low-power microscope or lens, fails to reveal ray fungus granules, but may reveal small particles and shreds of grass.

In all cases, free opening of the swelling, evacuating pus contents and syringing with antiseptic solution, and treating as an open wound, effects a cure and disappearance of such enlargements.

At the outset, the marked prevalence of such conditions would seem peculiar, and is difficult to account for by cattle raisers in such districts. Examination of the hay fed during the winter months, may not reveal at first sight anything likely to give rise to such a condition, but when shaken, a number of small, fine, sharp pointed grasses are thrown down. Examination of the surrounding country, where cattle are pastured, and also of the land where hay supply is procured, shows a great prevalence of grass commonly called by cattlemen in such districts 'needle' or 'wire' grass. These grasses, while indigenous to a large portion of this western country, would not appear to grow to the same extent and in the same manner in all districts, which may account in some measure, for not always giving rise to this condition.

In the district referred to they grow to a height of from 12 to 24 inches, very stiff in the stem, and at the top there always projects a dry, sharp point of from one-half to one inch in length. When the hay is cut it is largely mixed with such grasses, and, when cured, in handling, the sharp point or bristle breaks off. Cattle being fed such fodder partake of a considerable number of these sharp pointed agents, which, no doubt, penetrate the fauces and pharynx, and thus give rise to the tumours in question.

Samples of pus material taken from such tumours, submitted to and examined by the Pathologist of the Department at Ottawa, failed to reveal evidence of actinomycosis. Specimens of the grasses likewise forwarded, and submitted to the Botanist of the Department, were identified as a variety of rush known as '*Juncus Balticus*.'

Post-mortem observations of cattle slaughtered at abattoirs here, would support field observations as to the nature and causation of these tumours being other than actinomycotic, as their occurrence is confined to the sub-parotid region of the throat, while actinomycosis, here, shows a predilection of location for the maxilla bones, and, in a few cases, the tongue.

In a small number of cases, sub-parotid swellings in cattle have been found to be of tubercular origin, but this, however, does not appear to be a frequent cause of such swellings in this region.

From observations both in the field and post-mortem, it would appear that tumours affecting the throat region of cattle in this western country, frequently result from the penetration of the fauces and pharynx by sharp pointed grasses such as the one mentioned herein, '*Juncus Balticus*,' and other grasses commonly known as 'Spear Grass' (*Stipa Spartea*) and 'Skunk Grass' (*Hordeum Jubatum*).

#### QUARANTINE INSPECTION DIVISION.

Under this division, which consists in the enforcement and carrying out of the requirements of the regulations relating to animals' quarantine, there are maintained animals' quarantine stations in Manitoba, situated at Emerson, Gretna and Bannerman. At each of these quarantine stations a regular officer of the Branch is stationed.



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The equipment consists of a substantially fenced enclosure, and commodious, comfortable stable accommodation, well lighted and thoroughly ventilated. Caretakers are maintained, whose duties consist chiefly in keeping the yards and stable in a cleanly state and good repair, and the cleansing and disinfection of the yards and stables with limewash and carbolic acid, from time to time, as exigencies require.

In order to accommodate incoming settlers, I deemed it advisable to recommend to you that Snowflake be made an animals' inspection port, and this place was declared to be an animals' inspection port on or about March 1, 1910.

## EMERSON QUARANTINE STATION.

This is located at Emerson, on the International boundary line, at a point where the Canadian Northern and Canadian Pacific lines of railway, and their American connections, intersect.

During the past year it was considered necessary and advisable to enlarge the accommodation at this point. There was erected an addition, 18 feet by 100 feet, to the present stable building, another stable building, 16 feet by 50 feet, thus largely increasing the stable accommodation, and also a building 22 feet by 14 feet, providing office accommodation for the Inspector and a waiting room for the use of incoming settlers whose horses are undergoing inspection.

The equipment of this station now consists of a fenced enclosure 205 feet in length by 100 feet wide, together with stable accommodation for about 100 horses; inspector's office and waiting room for settlers. There is also a covered-in shed, isolated, which is used for the detention of swine during the required period of quarantine. A new well has also been dug in the yards, and substantially cribbed, providing a sufficient supply of water for requirements.

During the past year there has been presented for entry and inspection at the station the following number of animals:—

Horses, 4,086; mules, 564; cattle, 1,222; sheep and goats, 311; swine, 1. Fees collected, \$542.05.

2,274 horses and mules were submitted to the mallein test, of which 18 reacted and were refused entry, and 65 submitted to a retest.

Thirteen head of cattle were submitted to the tuberculin test, all of which proved healthy.

## GREYNA QUARANTINE STATION.

This station is located at Greytna, on the International boundary line, conveniently situated between the Canadian Pacific railway and the Midland branch of the Great Northern railway, each of which line has a branch spur running into the quarantine station.

The equipment consists of a substantially fenced enclosure, 140 feet in length by 120 feet wide; stable, 100 feet by 30 feet, providing comfortable accommodation for 45 animals, which is well lighted and thoroughly ventilated.

During the past year suitable office accommodation was provided at the quarantine station for the Inspector.

During the past year there has been presented for entry and inspection the following number of animals:—

Horses, 1,312; mules, 492; cattle, 441; sheep and goats, 54; swine, nil;. Fees collected, \$301.46.

1,033 horses and mules were submitted to the mallein test, of which number 15 reacted and were refused entry, and 18 submitted to a second test.



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BANNERMAN QUARANTINE STATION.

This station is situated on the B. S. and H. B. branch of the Great Northern line of railway, at Bannerman, distant from the International boundary line about three and a half miles.

The equipment consists of a substantially fenced enclosure, 140 feet in length by 120 feet wide. Stable, 100 feet by 30 feet, providing comfortable accommodation for 45 animals, which is well lighted and thoroughly ventilated.

During the past year there has been presented for entry and inspection the following number of animals:—

Horses, 864; mules, 18; cattle, 178; sheep and goats, 8; swine, nil. Fees collected, \$135.50.

256 horses and mules were submitted to the mallein test, of which number 4 reacted and were refused entry. Ten were submitted to a second test.

SNOWFLAKE AND MOWBRAY.

During the past year there has been presented for entry and inspection at these points, the following animals:—

Horses, 116; mules, 1; cattle, 70. Fees collected, \$1.

110 horses and mules were submitted to the mallein test and, proving healthy, were allowed to enter.

SPRAGUE.

During the past year the following animals were presented for entry and inspection at Sprague:—

Horses, 3; cattle, 21. Fees collected, \$3.

The three horses were submitted to the mallein test and proved to be healthy.

Summary showing total number of animals presented for entry and inspection at the various boundary points:—

Horses and mules inspected.. . . . .	7,456
Horses and mules tested.. . . . .	3,676
Horses and mules retested.. . . . .	93
Horses and mules reacting and refused entry.. . . . .	37
Cattle inspected.. . . . .	1,932
Cattle tested.. . . . .	13
Cattle reacting and refused entry.. . . . .	nil
Sheep and goats inspected.. . . . .	373
Swine inspected.. . . . .	1
Fees collected.. . . . .	\$983 01

MEAT INSPECTION DIVISION.

This division of the work consists in the carrying out of the various requirements of the Meat and Canned Foods' Act and the regulations relating thereto.

Inspection is maintained at four establishments here which are engaged in an export trade in meat and meat food products, viz:—

The J. Y. Griffin Company, known as establishment No. 18.

Gordon, Ironside & Fares, known as establishment No. 19.

Gallagher, Holman & LaFrance, known as establishment No. 20.

The Western Packing Company, known as establishment No. 21.



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An average number of ten inspectors have been stationed under this division during the past year, the entire time of these officers being devoted to the work.

All of which is respectfully submitted.

I have the honour to be, sir,

Your obedient servant,

C. D. MCGILVRAY,

*Inspector.*

The Veterinary Director General,  
Department of Agriculture,  
Ottawa.

## APPENDIX No. 5.

ARTHUR G. HOPKINS, B.Agr., M.D.V.

REGINA, March 31, 1910.

SIR,—I have the honour to present herewith my annual report for the year ending March 31, 1910.

The big inrush of settlers from the United States has materially increased the work and number of Inspectors at the boundary ports in Saskatchewan, especially at North Portal. During the preceding-fiscal year a change was made in dealing with import horses, inasmuch as an effort was made to test with mallein all horses and mules immediately or very soon after their arrival in Canada, the testing being done at Moosejaw as well as at North Portal, the accommodation at that time at the latter point being insufficient. As a result a material saving in expense was ensured by lessening the amount of travelling by Inspectors and by preventing the wide dissemination of glanders infection. Before the close of the fiscal year 1909-1910, the completion of the new quarantine stables and yards rendered it possible for the Branch to do the testing at North Portal. The great rush of immigration takes place during March and April, as many as 1,600 horses being presented in a week. Inspector McMurtry was placed in charge of the testing at North Portal, and had associated with him Veterinary Inspectors Chester, Dufresne, Poole and Young. A large number of owners presented charts referring either to tests made by B. A. I. inspectors or to tests made by practitioners and endorsed by Bureau officials, according to the regulations.

The tests made by our officers at the boundary show that a large percentage of the reactors come from the Dakotas. Below are appended the inspection totals and fees collected at the various boundary ports in Saskatchewan:—

—	Horses.	Mules.	Cattle.	Sheep.	Swine.	Goats.	Fees.
Big Muddy.....	405	13	27	.....	.....	.....	182.50
North Portal.....	13,146	87	680	85	26	14	979.26
Marienthal.....	88	2	20	.....	.....	1	31.25
Willow Creek.....	373	0	360	.....	.....	.....	222.30
Wood Mountain.....	496	4	331	.....	.....	.....	222.35



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Marienthal was opened in March, with Inspector G. H. Acres in charge as sub-collector of customs and Veterinary Inspector.

Glanders has, more than any other contagious disease of animals, engaged the attention of Inspectors of the Branch. I am pleased to note a growing appreciation of the value and reliability of the mallein test by farmers and others in the province, evidenced by the numerous requests for the tests which have been made to this office, which requests have been complied with when the work would permit. A number of suspected cases exhibiting nasal discharges have been reported, in several instances, by veterinarians, which, on investigation, have proved to be due to carious teeth. Laymen can be excused; it, however, indicates that many veterinarians have not had a training in the rudiments of veterinary dentistry, consequently the Department has been put to a lot of trouble and expense by this unfortunate lack of knowledge on the part of practitioners.

Reports received and forwarded by this office to headquarters indicate that any recrudescence of the disease in a neighbourhood is due to one of two causes, the introduction of an infected animal from the outside, or neglect to thoroughly disinfect the harness as well as the premises after an outbreak. The testing at the boundary, with the rejection of reactors, has cut down one source of infection for this disease. Investigations made by officers under my charge, as a result of outbreaks at such widely separated points as Saskatoon and Halbrite in shipments of branded horses brought to these points, indicate the ranges as another source of infection.

Inspectors Head and Young, when investigating and dealing with an outbreak of glanders in the Wolseley district, collected information from the widow of the late owner of the diseased animals which indicated that he had contracted the disease from his horses with fatal results, after protracted illness.

Mallein tests by field inspectors number 3,081 first tests, 1,021 retests (second), and 28 retests (third); 386 horses were ordered destroyed as reactors, valued at \$46,219, on which \$30,812.33 was awarded as compensation.

#### MANGE.

Outbreaks of this disease have been reported from time to time, in districts outside the mange area and the official treatment as prescribed in the regulations, ordered with beneficial results. Several shipments of horses presented by intending settlers have been rejected and returned by our officers at the boundary.

#### RABIES.

No reports of new outbreaks in the province have been received during the past fiscal year.

#### MALADIE DU COIT.

Fortunately no new outbreaks of this disease have been reported and it would appear that this province is free of this serious menace to the horse breeding industry.

#### ANTHRAX.

No cases of this disease have been brought to the notice of this office.

#### BLACK-LEG.

This disease is frequently brought to my notice by the demand for black-leg vaccine prepared by the Department. Vaccine has been sent out at the nominal cost of five cents per dose. Vaccination has also been recommended to many owners reporting deaths of young cattle with symptoms indicating black-leg.



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From time to time cases of lump jaw (actinomycosis) and tuberculosis are reported but no action is taken beyond that set forth in the regulations. Tuberculin has been furnished free of charge to veterinarians on request of their clients, and any reactors reported were subsequently ear-marked by an officer of the Branch. The tuberculin test is apparently very seldom used in Saskatchewan. The test is not even demanded by municipal health officers administering city by-laws dealing with the inspection of milk and dairies; none of the cities in this province have, at present, a veterinary officer dealing with matters pertaining to the public health as affected by the consumption of meat and milk.

During the fiscal year inspection of the disinfection and cleansing of stock cars was, by your instructions, inaugurated at Moosejaw.

Swamp fever is rarely heard of, many of the so-called swamp fever cases proving to be typhoid influenza. This disease has caused several losses in some localities, where it apparently has not been thoroughly understood and properly dealt with.

All of which is respectfully submitted.

I have the honour to be, sir,

Your obedient servant,

A. G. HOPKINS,  
*Inspector.*

To the Veterinary Director General,  
Ottawa, Ont.

## APPENDIX No. 6.

J. C. HARGRAVE, D.V.S.

MEDICINE HAT, ALTA., March 31, 1910.

SIR,—I have the honour to submit herewith my annual report of the province of Alberta and portions of Saskatchewan and British Columbia for the year ending March 31, 1910.

The year just passed has been found by your Inspectors to be one of great activity and considerable progress has been made, although at times the staff has been inadequate.

The public, on the whole, display a willingness to co-operate with your officers in their work, although occasionally there is displayed an antipathy to our efforts in connection with mange.

One must admit that much remains to be done in the province, but if present rate of progress is maintained for two years more, the work of controlling and eradicating contagious diseases will not have been without gratifying results.

The work throughout the province has necessitated considerable travelling, but the exigencies of the work in the office has rendered it impossible to devote as much time as is really required in visiting the different portions of the province.

Early in the year you saw fit to place in my charge the mange infected area of Saskatchewan, which added very largely to the already large field of operation in connection with mange in cattle, in addition to which, in August, the boundary stations Gateway and Kingsgate in British Columbia, were transferred to this office.

During the year I have personally inspected 1,370 horses, 5 mules and 45 cattle, destined to points outside the province.



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## MALADIE DU COIT.

In my last annual report I predicted the early eradication of the disease, yet, the number slaughtered during the past twelve months was slightly in excess of last year, and during the fall and winter two fresh outbreaks were discovered, in the Calgary and Raymond districts, which, however, are being energetically handled, and although suspicion is directed against a large number, yet the number so far found infected is but a small percentage. Aside from these outbreaks, very few were slaughtered in the old infected districts.

In addition to the Inspectors who have in the past dealt with the disease, Dr. Watson, of the quarantine station, Lethbridge, has assisted very materially in the field work.

An effort was made to undertake the work of gathering the wild and estray horses ranging on the north side of the Red Deer and Saskatchewan rivers, which have run in that district for years without being gathered and which have been exposed to the infection of maladie du coit. No one, however, could be found to undertake the work so late in the year and it was therefore decided to postpone this work until next year, when the work could be commenced earlier in the season.

## ALBERTA.

Number slaughtered, including four (4) ownerless.. . . .	37
Value.. . . .	\$5,130 00
Compensation.. . . .	3,419 98
Average valuation, stallions (1 grade, 3 registered).. . . .	262 50
Average valuation, mares (including 1 pure-bred).. . . .	140 69
Number suspected and quarantined.. . . .	241

## SASKATCHEWAN.

Number quarantined.. . . .	3
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It is quite evident that in the old infected centres one must expect occasional outbreaks for some time to come, as insidious cases are extremely difficult to detect, especially when you take into consideration the fact that it is found impossible to make re-inspection oftener than once in three months.

## GLANDERS.

New centres of this infection are from time to time being discovered; particularly is this the case in the northern portion of the province.

These, as found, are dealt with as rapidly and energetically as possible, an effort being made to clean up each outbreak before proceeding to another.

Inspector Caldwell, of Edmonton, dealt in a creditable manner with an extensive outbreak in the Hardisty district, which had, unfortunately, existed for some considerable length of time before being detected.

Additional inspectors could be utilized in the northern portions of the province as I am confident that there is more cases of glanders in those parts than what have so far been detected.

The number of settlers' horses permitted to proceed to destination untested were not as large as last year, with the result that nearly all were located and tested, there remaining in the province on March 31, untested one hundred and seventy-three (173) head. Of those tested at destination, ten (10) head reacted.

The following figures denote the number of horses (native and settlers' separate) tested with mallein and the number destroyed during the year:—



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## GLANDERS STATISTICS.

*British Columbia (Crow's Nest District).*

## Horses tested—

Once.. . . . .	50
Twice.. . . . .	39
Thrice.. . . . .	1
<hr/>	
Total tests.. . . . .	90

## Horses slaughtered—

On first test.. . . . .	2
Value 1.. . . . .	\$150
Value 1.. . . . .	75

*Alberta.*

## Native horses tested—

Once.. . . . .	1,404
Twice.. . . . .	288
Thrice.. . . . .	28
Fourth.. . . . .	11
<hr/>	
	1,731

## Slaughtered—

On first test.. . . . .	75
On second test.. . . . .	8
On third test.. . . . .	3
On inspection.. . . . .	1
<hr/>	
	87

Total valuation of 86 head.. . . . . \$10,134 00  
(Compensation withheld for one horse).

Average valuation.. . . . .	117 83
Total compensation paid on 86 head.. . . . .	6,755 85
Average compensation.. . . . .	78 55
Horses seized by customs and tested once (included above).	

## Settlers' horses tested—

Once.. . . . .	659
Twice.. . . . .	298
Thrice.. . . . .	43
<hr/>	
Total tests.. . . . .	1,000

## Slaughtered—

On first test.. . . . .	1
On second test.. . . . .	9
<hr/>	
	10

## Settlers' horses untested March 31, 1910—

Untested.. . . . .	173
Returned to United States.. . . . .	14
Died after arrival.. . . . .	7
<hr/>	

	194
Native horses awaiting retest March 31, 1910.. . . . .	129



MANGE.

It is again possible to report progress in the eradication of horse mange. No large herds have been found infected and the total number of horses quarantined during the year were 452, as against 2,828 for the year previous, of which only 81 presented symptoms of mange.

In certain districts where it formerly prevailed it has not made a reappearance, clearly demonstrating the efficiency of the official dipping solution and the measures adopted by your Inspectors.

In comparison with previous statistics almost as favourable a situation exists with respect to cattle mange. As previously mentioned the entire mange infected area was handled from this office necessarily demanding a great deal of attention as the work in the additional territory necessitated reorganization and was largely under the supervision of Inspector Morgan. The result of the year's operations within the area in Saskatchewan was very satisfactory and at the end of the fiscal year mange existed in one herd only east of range 20, this herd being reinfected by stock from Alberta.

I hope to be able to recommend the removal of districts 8 and 9 from the area by the end of the ensuing fiscal year as well as district 13, lying north of the Red Deer river and in which practically no mange has been found this year. Throughout the remaining portions of the area the number of cattle dipped almost equalled the total last year, but the number of infected herds were less, the difference being made up by a much larger number of cattle being classified as contact cattle, and in addition a much smaller percentage of cattle showing indications of mange were found in the infected herds, thus showing in addition to the good results in Saskatchewan and the satisfactory situation in district 13, that fair progress is being made throughout the whole of the mange infected area.

The lime and sulphur mixture still continues to give every satisfaction, giving better results than any other preparation.

STATISTICS for cattle mange, year ending March 31, 1910.

Number herds quarantined.. . . .	461
Number cattle quarantined.. . . .	135,197
Number cattle dipped twice.. . . .	136,836
Number cattle dipped once only.. . . .	6,156
Number cattle hand treated.. . . .	627

STATISTICS for cattle mange, year ending March 31, 1910.

Premises quarantined.. . . .	35
Number of horses quarantined and treated.. . . .	452
Number of horses presenting symptoms of mange.. . . .	81
Number of premises remaining in quarantine.. . . .	14

TUBERCULOSIS.

The tuberculin test was applied to thirty-three (33) head of cattle by private veterinarians with tuberculin supplied by your Department through this office, and the reactors—four (4) in number—were ear-marked in accordance with the regulations.

BLACK QUARTER.

A very few cases have been reported throughout the province. Sales of vaccine to the extent of nine hundred and thirty (930) doses made during the year.



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## RABIES.

The Ministerial Order of March 3, 1909, put into effect as a result of rabies being detected in Red Deer and Innisfail, was maintained until midsummer.

This outbreak, you will remember, was discovered by Inspector Nyblett, in March, 1909, and was dealt with so successfully that the muzzling order was cancelled, as above mentioned, by midsummer.

During the year two dogs that left Ontario a few days before the rabies' order came into effect in that province were immediately quarantined on their arrival at Red Deer as a preventive measure. At this date neither have developed any symptoms of rabies.

Number of outbreaks—continued from previous year.. . . .	1
Number of premises quarantined.. . . .	4
Number of animals quarantined.. . . .	9

## BOUNDARY STATIONS

There are five of these in charge of this office, two of which—as mentioned elsewhere, Gateway and Kingsgate, B.C.—were taken over last August.

## Pendant d'Oreille—

Number of reactors.. . . .	None.
----------------------------	-------

## Coutts—

Number of reactors returned to United States.. . . .	5
Number of contacts returned to United States.. . . .	9

## Twin Lakes—

Number of reactors returned to United States.. . . .	3
Number of contacts returned to United States.. . . .	7

## Gateway—

Number of reactors returned to United States.. . . .	2
Number of contacts returned to United States.. . . .	8

## Kingsgate—

Number of reactors.. . . .	None.
----------------------------	-------

During the past winter a new site was selected on the International boundary line, at Pendant d'Oreille, for a quarantine station.

The inspection of stock shipments during the past year has again occupied a great deal of time. In addition to those being shipped to points within the province there has been examined for shipment to points outside the province thirty thousand seven hundred and seven (30,707) animals.

The Ministerial Order No. 37, which went into effect last autumn, providing for the cleansing and disinfection of cars carrying stock at certain divisional points, relieved your Inspectors to a great extent. This work is now done at Edmonton, Strathcona, Calgary, Lethbridge and Medicine Hat, under the supervision of car inspectors, except at the last mentioned point, where one of the regular inspectors gives this matter the required attention.

I have the honour to be, sir,

Your obedient servant,

J. C. HARGRAVE,

*Inspector.*

Dr. J. G. RUTHERFORD, C.M.G.,

Veterinary Director General,  
Ottawa Ont.



## APPENDIX No. 7.

S. F. TOLMIE, V.S.

VICTORIA, B.C., March 31, 1910.

SIR,—I have the honour to submit my annual report for the year ending March 31, 1910.

At the port of Victoria—417 horses, 16 mules, 5 cattle, 5,641 sheep and 1 goat were inspected.

The quarantine station here has been repaired and whitewashed during the year and is now in good condition.

At the port of Vancouver—176 horses, 1 mule, 1 cattle, 17,241 sheep, 3 foals.

Car inspection has been regularly carried on at this port and a large number of cars from the mange-infected area of Alberta have been disinfected. Entry was completed on some 86 horses entered for racing purposes at Vancouver. They were all subjected to the mallein test.

At the port of New Westminster—Cattle, 12; sheep, 1,931.

White Rock—843 horses, 8 mules, 70 cattle, 1,899 sheep, 3 goats.

Huntingdon—334 horses, 4 mules, 198 cattle, 27 sheep, 1 goat, 2 foals, 13 calves.

Three horses rejected on mallein test.

A new quarantine stable was erected at Huntingdon during the year on land leased from the C.P.R. This will prove to be a great assistance in handling stock at this port.

Two cattle rejected on tuberculin test.

At Osoyoos—247 horses, 2 mules, 4 cattle, 2,481 sheep were inspected.

At this port 132 mallein tests were made. Six horses reacted and were refused admission. Four were also rejected on account of showing symptoms of *maladie du coit*.

Keremeos—49 horses, 12 cattle, 627 sheep.

Bridestown—62 horses, 8 cattle, 794 sheep; 14 horses rejected, 3 of which reacted to the mallein test.

Myncaster—22 horses, 8 cattle, 1,130 sheep. 2 horses being rejected on reaction to the mallein test.

Midway—17 horses, 52 cattle. 1 horse rejected on reaction to the mallein test.

Grand Forks—76 horses, 90 cattle, 141 sheep, 2 swine.

Nelson—52 horses, 6 mules, 159 cattle, 50 sheep, 19 goats. 2 horses rejected on reaction to the mallein test.

Roseland—28 horses, 129 cattle, 443 sheep. 1 horse rejected on reaction to the mallein test. 1 cow rejected on reaction to the tuberculin test.

Rykerts—37 horses.

Nanaimo—49 mules were inspected.

Glanders has been reported a few times. On investigation only 2 reactors were found in the Okanagan and one at Victoria.

Hog cholera has appeared in many parts of the Fraser valley and Vancouver Island. In Chilliwack the most extensive outbreak occurred. The disease first appeared in a very mild form. The owners of the swine affected attributed the sickness



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to other causes with the result that the disease was much scattered before being discovered. It was found necessary to make a house to house inspection at intervals before the disease was overcome.

Total number of swine destroyed during year, 526.

Compensation paid, \$3,233.72.

An outbreak of Horse Mange occurred on several Indian reserves in the Fraser Valley. A large number of horses were hand dressed and the disease is now well under control.

The source of infection as far as can be learned was the result of Indian horses travelling back and forth across the American boundary.

An outbreak of sheep scab has been dealt with in Agassiz and Chilliwack districts. The number of infected animals was 1,181. The infection was brought from California in a band of sheep belonging to the E. Clemens Horst Company of Chilliwack. No other flocks became infected from this band.

Owing to the inclement winter weather coming on shortly after the outbreak was first reported, the disease could not be dealt with as rapidly as desirable but the outbreak is now entirely cleaned up and no Scab exists in British Columbia at the present time.

Black Leg was reported during the year in the Nicola Valley and a number of animals died before the conditions were reported. Dr. Tamblyn was sent to the district in question to instruct the farmers in the use of Black Leg Vaccine and arrangements were made with Mr. J. A. Guichon of the Nicola Valley to handle vaccine and vaccination outfits of the Department. This has proven a great convenience to the stock men interested.

28 cattle and 2 swine were inspected for export during the year.

I have the honour to be, sir,

Your obedient servant,

S. F. TOLMIE,

*Inspector.*

The Veterinary Director General,

Ottawa, Ont.

## APPENDIX No. 8.

CHAS. H. HIGGINS, B.S., D.V.S., F.R.M.S., PATHOLOGIST.

OTTAWA, March 31, 1910.

SIR,—I have the honour to transmit this my eleventh annual report as an officer of the Department of Agriculture, my eighth as its pathologist.

Without further remarks I will enter upon some of the details connected with our work during the past year. The number of specimens examined has shown a considerable increase, there having been 425 series as compared with 376 series during the year preceding. Our manufactured products have, as formerly, consumed a considerable portion of the laboratory routine.

Detailed information will be found under the various headings which follow concerning some of the more important features of our work during the past year. I may, however, be permitted to add that there are many subjects of interest on which we have spent considerable time during the past year that are in such an in-



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complete state as to render specific details of little value to the reader of this report. It is hoped that this information may be completed at some future date and embodied in reports on special subjects.

## MALLEIN.

We have continued the preparation of mallein with satisfactory results, and while the increase in our disbursements is not so great as that recorded for the past few years, we are experiencing less trouble in its manufacture than at any previous time. The disbursements for the past year are as follows:—

	1906-07.	1907-08.	1908-09.	1909-10.
April.. . . . .	1,370	1,750	3,861	2,905
May.. . . . .	702	1,600	3,140	3,525
June.. . . . .	1,400	1,308	2,720	1,340
July.. . . . .	1,645	2,205	3,000	2,191
August.. . . . .	1,730	1,675	2,347	1,660
September .. . . .	1,786	1,150	2,200	2,700
October.. . . . .	1,245	1,835	1,935	2,670
November .. . . .	598	1,895	2,567	2,850
December .. . . .	225	553	1,420	1,085
January.. . . . .	712	2,090	905	1,760
February.. . . . .	830	1,320	1,260	2,290
March .. . . . .	2,060	3,565	7,460	7,950
	<hr/> 14,303	<hr/> 20,946	<hr/> 32,815	<hr/> 32,926

## TUBERCULIN.

There has been a falling off in the disbursements of tuberculin prepared at this laboratory during the past year. Tuberculin is the product with which we experience the least trouble in preparing and maintaining at a given standard. This is largely due to the fact that errors are more readily detected and rectified than with our other preparations. We have confined our efforts to the preparation of the ordinary old tuberculin of Koch for subcutaneous injection into cattle. Other preparations of tuberculin can be prepared, on request, for special requirements. Special residual bacilli emulsion tuberculin, which we furnished physicians over a year ago, has been used on cases of human tuberculosis with beneficial results, although no detailed case reports are yet available. The following statement gives our disbursements for the past four years:

	1906-07.	1907-08.	1908-09.	1909-10.
April.. . . . .	267	509	878	648
May .. . . . .	349	848	829	418
June.. . . . .	160	206	992	496
July.. . . . .	184	257	1,190	887
August.... . . . .	161	336	323	760
September .. . . .	254	583	214	335
October.. . . . .	118	276	458	474
November.. . . . .	423	565	826	561
December.... . . . .	336	735	807	488
January.. . . . .	589	562	322	282
February.... . . . .	437	575	257	634
March .. . . . .	152	482	1,035	617
	<hr/> 3,430	<hr/> 5,934	<hr/> 8,131	<hr/> 6,600



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## BLACK-LEG VACCINE.

This vaccine still gives satisfaction to those using it and the method of administration also seems to be efficient, if one can judge by the absence of criticism. Our disbursements are increasing, and I believe that it will be necessary for us to design a special machine for performing the various operations that are now accomplished by hand. While such a machine will be rather expensive at the outset, the saving in labour and the rapidity with which the work can be accomplished through its use will more than compensate for the necessary outlay. Our disbursements for the past three years have been as follows:—

	1907-08.	1908-09.	1909-10.
April .. .. .	250	2,185	1,330
May.. .. .	392	1,177	1,114
June.. .. .	554	601	1,714
July.. .. .	392	572	1,007
August.. .. .	254	550	310
September.. .. .	586	734	899
October.. .. .	998	260	360
November.. .. .	785	218	788
December.. .. .	1,560	410	380
January.. .. .	...	35	136
February.. .. .	270	420	4,761
March.. .. .	990	902	730
	7,031	8,064	13,469

## ANTHRAX VACCINE.

The diminishing requirements for this product can be favourably commented upon. The possibility of a large outbreak requiring a greatly increased output is before us, but with the improved method of preparing and disbursing the vira in a dry form, enables us to anticipate events and prepare our vaccines far in advance of necessary requirements. Since the inauguration of this method of supplying dried anthrax vaccines at this laboratory, commercial houses have considered this method with a view of supplying their vaccines in a similar manner. The disbursements for the past three years have been as follows:—

	1907-08.	1908-09.	1909-10.
April.. .. .	239	...	...
May.. .. .	17	...	38
June.. .. .	...	...	112
July.. .. .	98	256	47
August.. .. .	77	75	40
September.. .. .	5	10	62
October.. .. .	15	43	17
November.. .. .	...	...	...
December.. .. .	32	25	...
January.. .. .	...	10	...
February.. .. .	...	...	...
March.. .. .	...	36	70
	483	455	386

## SWAMP FEVER.

Acting on your instructions I have consulted with Dr. J. L. Todd relative to his work with this disease at Macdonald College. This work has proven very interest-



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ing, and will, I believe, be a fruitful source of information concerning this puzzling malady. From what I have been able to learn of swamp fever and the experience of others with allied diseases, some time must elapse before definite results are available or opinions formulated. This being the case, I believe it advisable to enlarge this experiment to such a degree that the results when available will be deduced from a sufficient number of animals to warrant the drawing of accurate conclusions. With the careful and conscientious work conducted by Dr. Todd, but a few months will elapse before the general trend of the investigation will be apparent, and it may then be possible to increase its scope, thereby enhancing the value of the final results.

#### HOG CHOLERA.

At your wish investigations were also commenced last fall to determine the nature of a disease affecting hogs in the vicinity of Ottawa. Four hogs were received, and it was found that the blood of two, after being passed through Chamberland filters 'B' and 'F', when inoculated subcutaneously, produced in hogs a disease indistinguishable from true hog cholera. Further experiments of a purely practical nature are contemplated and will be proceeded with immediately the weather permits. No effort has been made to produce the immunizing serum by the method patented in Canada or by other means. I am of the opinion, however, that we have at this time at least one naturally immunized animal, and I believe that further work with this affection should be undertaken, but the facilities at our disposal are wholly inadequate for such work on a scale commensurate with the importance of the disease.

#### POULTRY DISEASES.

We are still devoting a portion of our time to the examination of poultry and the diagnosis of pathological conditions that have resulted in losses to owners. Tuberculosis seems to be gaining a greater foothold and we have received a number of affected birds from widely separated sources. The investigations of Mohler and Washburn of the United States Bureau of Animal Industry, demonstrating that tuberculosis can be conveyed to hogs through the eating of the viscera of fowls dead of the disease is worthy of more than passing notice. The fact that eggs obtained from affected fowls may contain tubercle bacilli capable of infecting guinea-pigs, is anything but reassuring. How dangerous this type of tuberculosis is to the human race, our present data furnishes very inadequate information. Further investigations are required as the disease is of importance to consumers as well as to raisers of poultry.

White diarrhœa among chicks is still a source of annoyance to poultrymen, and while considerable attention has been devoted to this affection by various workers, there is still some controversy as to the causative agent. I have not met with arguments or writings on the subject which carry with them the weight of conviction. There is still an opportunity for the various workers to be more explicit concerning the malady with which they are working, and a need for greater precision in experiments that erroneous conclusions may not be drawn therefrom. Some investigators have been too ready to theorize on wholly insufficient data. From the chicks that I have been privileged to examine, conclusive evidence has not been forthcoming to lead me to change my opinion that the condition is largely due to delayed physiological function. From a physiological standpoint I believe that it will be necessary to accurately determine the various processes during incubation before a logical explanation can be made or measures formulated that will be fruitful in preventing losses accompanied by this manifestation.

#### ENTERO-HEPATITIS.

*(Black-head of Turkeys.)*

Enterio-hepatitis is still the most potent factor in raising the already high prices of turkeys to the consumer, not only in Canada but in the United States, where it



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has received considerable attention from various investigators. Originally described by Dr. Theobald Smith as being due to the parasite *Amoeba meleagridis*, many now hold that it is due to a coccidium. While circumstances have not been such as to permit a detailed study of the disease, with a view of elucidating this technical point, nevertheless we have been able to recognize the affection in birds received for diagnostic purposes. In connection with this affection it is significant to note that Dr. Wheeler in his last report as Director of the Rhode Island Experiment Station, comments as follows on the results of their investigations:—

‘Although during the past year the investigations of the blackhead problem have thrown more light upon the etiology of the disease, the main issue remains unsolved:—How can turkeys be kept free from blackhead?’

From the investigations of various workers as well as my own experience, I believe that steps should be taken at once to determine whether the treatment of affected birds is feasible. It may be found that they can be carried over the acute stage and that nature can then successfully cope with the infection. Total eradication seems an almost unhopd for solution of the difficulty, as it is generally considered that the parasite may be present in the egg, on the egg and to exist in the intestinal tract of the common fowl as well as in affected turkeys. Much remains to be explained concerning the disease, and an effort in this direction should, in my opinion, follow the lines above outlined.

## MUSEUM SPECIMENS.

In addition to the increase of our displayed specimens at the laboratory, we have provided exhibits of preserved specimens for the Toronto and Ottawa Exhibitions showing conditions frequently met with by the Meat Inspection Division, and we have further prepared specimens for use in anti-tuberculosis exhibits. We are constantly adding to our museum and are very grateful for the receipt of tissues showing uncommon or unusual lesions.

Many minor investigations other than those mentioned have been taken in hand from time to time, but owing to the limited amount of work we have been able to accomplish in this connection, there is little to offer of general or special interest.

In closing this report I may again be permitted to point out the advisability of an increase in the laboratory staff, and the accommodation provided for routine work, the manufactured products and special investigations, features which have already commanded your sympathetic interest and which will, I hope be amply provided for at an early date.

I have the honour to be, sir,

Your obedient servant,

CHAS. H. HIGGINS,

*Pathologist.*

The Veterinary Director General,  
Ottawa, Ont.

## APPENDIX No. 9.

SEYMOUR HADWEN, D.V.S.,

ASSISTANT PATHOLOGIST,

Mt. LEHMAN, B.C., March 31, 1910.

SIR,—I have the honour to submit my report for the year ending March 31, 1910.

I returned to duty in your Department in July after nearly a year's leave of absence in Europe, where I went to improve my knowledge of parasitology.



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Shortly after my return I was instructed to make a trip through Manitoba to collect biting flies and ticks, on the assumption that these might have something to do with the dissemination of the disease known as Swamp Fever among horses.

Only two specimens of the flies you considered most likely to be concerned in this transmission, *i.e.*, tabanidæ, were found, the season being unfavourable for them.

Numerous specimens of mosquitoes and the horn fly (*hæmatobia serrata*) were found biting freely but strange to say *Stomoxys calcitrans* (the stable fly) was not encountered; this is a most singular thing and is worthy of note; both in Ontario and British Columbia this fly is very troublesome to cattle and horses.

During my stay in Manitoba I received two specimens of a tick which I identified as a *Hoemaphysalis*; they were collected for me by Dr. Hobbs from a steer.

This finding may prove to be of economic importance as the tick has since been positively identified by Professor Nuttall of Cambridge as *hæmaphysalis punctata*, the British carrier of red-water. The tick is apparently not a new importation as specimens were collected a year previously by Dr. McGilvray also off cattle at Winnipeg. This double capture makes it highly probable that the tick can survive the winter and that it has become established in Manitoba.

I would respectfully suggest that the next time these ticks are encountered on an animal that an inquiry be made to find out where the animal originated and to see if it harbours piroplasma.

In August I attended the meeting of the British Association and gave an address on the curative treatment of Texas Fever with trypanblau. I was then recalled to Ottawa to take charge of the laboratory which became necessary owing to the pathologist being taken ill.

In September I obtained leave to attend the annual meeting of the A.V.M.A. at Chicago, where I read a paper on Piroplasmosis canis and bovis.

On October 6 I was instructed to proceed to British Columbia to continue the red-water investigation which had discontinued temporarily owing to the resignation of Professor Bowhill. En route in company with Dr. Hargrave I visited the Dourine Experiment Station at Lethbridge, where a few days were very profitably spent with Dr. Watson who showed us the work he was doing.

Shortly after arriving in British Columbia Dr. Tolmie and I made a tour of the Fraser Valley, where red-water is most prevalent among cattle.

I may say now that when I came out to British Columbia I was under the impression from reading my predecessor's reports that the disease I was coming to study was Piroplasmosis bovis. I found shortly after my arrival that though there were numerous cases of red-water (*hæmaturia*) about, I could not find any cases of piroplasmosis (*hæmaglobinuria*). I made as complete a study of the conditions as was possible in the time, and in January sent you my first report, giving proofs that the cases I had been working at were of *hæmaturia* and not of piroplasmosis; also that I could not agree with many of the statements made by Professor Bowhill regarding the piroplasma infection of cases he described.

I do not wish to place myself on record as stating that piroplasmosis does not exist in British Columbia or of its possible introduction. The mere fact of *H. punctata* being found in Manitoba is enough to make one guarded in this particular.

Further evidence has since been obtained corroborating the above statements.

Blood preparations made by Professor Bowhill on which he claimed there were piroplasmata, were examined by me, and on failing to find parasites, I suggested to you that the films be forwarded to Professor Theobald Smith of Harvard University to confirm my findings; this was done and a report shortly received from him saying that he had failed to find any intraglobular parasites suggesting piroplasma.

As the present investigation was started to find out the causes of the affection among cattle here, the above statements are necessarily of importance.



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In my report I made various recommendations for future experimentation, which I hope you will approve and sanction. This condition of hoematuria affecting the cattle is a very serious one and is a distinct handicap to the dairy industry of certain sections of British Columbia.

In conclusion I wish to thank you for the opportunity you have given me to study this and other conditions; I also wish to express my thanks to Dr. Tolmie for his valuable help in the present investigation.

I have the honour to be, sir,

Your obedient servant,

SEYMOUR HAWDEN,

*Assistant Pathologist.*

To the Veterinary Director General,

Ottawa, Ont.

## APPENDIX No. 10.

E. A. WATSON, V.S.,

ASSISTANT PATHOLOGIST,

EXPERIMENTAL QUARANTINE STATION,

LETHBRIDGE, ALTA., March 31, 1910.

DR. J. G. RUTHERFORD,

Veterinary Director General,

Ottawa, Ont.

SIR,—I have the honour to report as follows on 'An Experimental Study of Dourine or Maladie du Coit.'

I have the honour to be, sir,

Your obedient servant,

E. A. WATSON,

*In charge Experimental Station.*

## SECTION I.—Introduction—

*Different strains of dourine*—Their source, natural transmission, artificial transmission, inoculation in small animals, and results. Variations in virulence. The interval of incubation.

## SECTION II.—

*Immunity*—Natural immunity and susceptibility. Acquired immunity, active, passive.

## SECTION III.—

*Remarks on the Parasite of Dourine*—Is *T. equiperdum* a true blood parasite? The role of phagocytosis in Dourine. Vitality of *T. equiperdum* under artificial conditions.

## SECTION IV.—

*Diagnosis*—The plaque or cutaneous symptom and its position in diagnosis, a study. Oedematous conditions other than plaques. Genital symptoms. Body temperature (paroxysms of fever). Ocular lesions. Sexual power and procreation. Examination of body fluids for the trypanosoma. Gland palpitation and puncture. The relative value of postmortem findings. Note on serum diagnosis.



## SECTION V.—

*The Experimental Treatment of Dourine*—Records of experiments with Atoxyl, records of experiments with Atoxyl and Mercury, records of experiments with Atoxyl and Donovan's sol. Summary of results. Some general remarks on experimental treatment and our present means of testing a cure or recovery. References to literature.

## SECTION VI.—

*Experiments on Breeding in Relation to Dourine*—Table II, showing summary of results. Remarks on the results of the breeding experiments.

*Concluding remarks*.—Tables I-II.

REPORT OF THE EXPERIMENTAL STATION (HEALTH OF ANIMALS,) LETHBRIDGE, ALTA.

DOURINE OR MALADIE DU COIT, AN EXPERIMENTAL STUDY.

BY E. A. WATSON.

*Introduction.*

Certain inoculation experiments that I commenced at the end of the year 1906 and in 1907, with the object, primarily, of determining the suspected protozoan nature of the disease diagnosed as dourine upon clinical symptoms alone, have been successful, though the results and positive proofs have been, in some cases, very late in forthcoming owing to prolonged intervals of incubation and a mild or obscure infection.

My earlier observations (contained in special report on *maladie du coit* or dourine, November, 1907), on the specific *trypanosoma* of the variety of dourine which had appeared in western Canada I have been able to repeatedly confirm by isolating the parasite from several different centres of infection, by reproducing the disease in healthy horses by inoculation of the parasite and by observing the same upon many hundreds of occasions in certain body fluids of infected equines.

Nevertheless, the detection and study of the *trypanosoma equiperdum* in its natural host is attended with the greatest difficulties and only at the expense of a great amount of time and labour, for, as it is now well known, the course of dourine in the horse is usually a very irregular one, the periods of trypanosome activity in the accessible fluids being of rare occurrence, few and far between, of brief duration and even then, more frequently than not, the parasites are scanty in numbers. It is not surprising, therefore, that in a number of cases of naturally acquired dourine obtained in this district and held under observation for varying periods of time, trypanosomata could never be detected. However, by a selection of cases in which the infection had not reached an advanced stage, by maintaining a constant lookout for œdematous swellings of the genital organs and of the skin and by keeping up systematic microscopical examinations of the fluids of such swellings and of the mucous membrane of the vagina, trypanosomata can be brought to view.

From each one of five clinically affected equines coming from four different breeding establishments in this district I have succeeded in obtaining a strain of the dourine *trypanosoma*. In European, Algerian, Indian, and, we may add, American, dourine the variation in virulence is becoming a notorious fact, not only in the different varieties but also in different strains of the same variety. Passing from animal to animal of a certain breed a strain of dourine may increase in virulence while in another breed it appears to lose a great deal of its pathogenic properties; at the same time, certain individual animals of either or any breed appear far more susceptible or resistant, as the case may be, than others.



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The strains of dourine which are dealt with in this section of my report, although in all probability, removed by only a few generations from a single, original strain which cannot be traced, will be considered as five different strains and referred to as A, B, C, D, and E, strains, respectively, the observations upon or experiments made with each being described in the order indicated, and as follows:—

## DIFFERENT STRAINS OF DOURINE.

## 'A' Strain.

*Source.*—A Clydesdale stallion, No. 33, first showing symptoms of dourine in the year 1905. The illness, during the latter half of the year 1905, was marked, chiefly, by intermittent œdematous swellings of the genital organs and lower surface of the abdomen, and terminated in death (July, 1907), about two years from its commencement.

*Natural transmission.*—A grade mare, animal No. 73, was found in an advanced stage of dourine in the spring of 1907; an inquiry into the history of the mare left little doubt but that she was naturally infected by the above stallion in 1905 or in 1906. The chief symptoms were an irregular, unbalanced gait, articular crepitations, vaginal discharge and emaciation. On August 13, 1907, there occurred a severe exacerbation of genital symptoms. In the fluid of a swelling that followed the injection of a test-serum developmental forms of trypanosomata were found. In the last months of this year, 1907, there was persistent vaginal discharge, diarrhoea and increasing emaciation, death taking place upon December 19. Frequent examinations of the blood and vaginal fluids were always negative.

A filly-foal was born to this mare in May, 1907. The foal never appeared in normal health; when seven months of age it developed a severe form of strangles, from which it recovered. In the spring of 1908 there was noticeable a dragging paralytic gait in the hind limbs which steadily became more pronounced. Later, the fetlock joints weakened, first on the hind and then of the front limbs, finally giving way and knuckling over forwards. The animal died of emaciation and paralysis when two years of age. Examinations of the blood and vaginal fluids were always negative. Proof of dourine infection was never established though the symptoms were very suggestive.

*Artificial transmission.*—Animal No. 26.—Two year old filly. Received several inoculations with the blood of stallion No. 33, in November, 1906. Throughout the year 1907 the result of the inoculations remained in doubt. Trypanosomata could never be detected. The vaginal secretions were increased in quantity, there was, occasionally, a slightly stiffened and suspicious muscular action, the body had an undernourished appearance but there was never presented any definite symptoms of the disease. In 1908, nothing occurred to arouse suspicion until August 22, when a small, thin plaque appeared on the skin over the middle right ribs and the submaxillary glands showed much enlargement. The plaque and the glands were punctured with a fine needle and in preparations taken from the former trypanosomata were found present; examination of the gland juice, of the blood and vaginal fluids was negative. In November, 1908, all symptoms and traces of symptoms disappeared and the animal maintains a normal condition. This lone plaque, occurring in the 21st month after inoculation, constituted the only clear sign of infection during a period of observation extending over 2½ years.

*Inoculations in small animals.*—Three dogs, three rabbits and six mice were inoculated with the blood or œdematous fluids of stallion No. 33. Signs of infection in these animals were always lacking and the trypanosoma was never recovered.



*'B' Strain.*

*Source.*—A range mare, animal No. 28, showing pronounced symptoms of chronic dourine in May, 1906. Two months later the mare gave birth to a filly-foal which appeared in normal health up to the time of its artificial infection (see experimental inoculations with 'E' strain, animal No. 29). In November and December, 1906, the condition of the mare was that which characterizes the final stages of dourine, namely, emaciation, loss of muscular co-ordination and paralysis. Death from dourine occurred in January, 1907. Trypanosomata were never detected in any of the numerous preparations of the blood and body fluids taken during the life of the animal and after death.

*Artificial transmission.*—Animal No. 27, a two-year-old filly.—On October 29, 1906, some of the vaginal discharge of the mare No. 28 was injected into the vagina. Between November 19 and December 3, the filly received intravenous, intraperitoneal and intramuscular inoculations of blood from mare No. 28. Up to Jan. 28, 1907, examinations of the blood and vaginal fluids for trypanosomata were negative. Blood was then drawn from the jugular vein until signs of distress were plainly evident, hoping by this means to reduce what appeared to be a natural resistance to infection. A few days later, cold serous swellings developed between the muscles of the limbs, especially about the joints, and persisted for nearly one month. A thorough search for trypanosomata in these serous fluids was made, but proved fruitless, and no better results were obtained from further examinations of blood and fluids from the vaginal mucous membrane. From March to July, 1907, the general health and condition was below normal, but no symptoms were presented referable to dourine.

On July 27th, 25 c.c. of a dourine serum ('A' strain) was injected under the skin of the neck, the serum being first passed through a Chamberland filter. The reaction that followed was very similar to a mallein reaction in a glandered animal. In one preparation of a large number examined of the fluid of the swelling, a few trypanosomes were detected. Absorption of the swelling commenced at about the 24th hour and was complete at the 48th hour.

From this time there was a slow, but perceptibly increasing loss in flesh. From January to March, 1908, there was emaciation and loss of muscular co-ordination. The filly died on April 15, in the 16th month after inoculation. The musculature was found to be infested with sarcosporidia.

*Inoculations in small animals.*—Eight dogs and two mice received inoculations of blood, taken during life, and of ascitic and cerebro-spinal fluid, taken immediately after death, of mare No. 28. Three mice were inoculated with serous fluid from the joint swellings on filly No. 27.

There was never any clear evidence of infection in any of these animals; blood examinations were always negative.

'B' strain was lost on the death of the filly, animal No. 27.

*'C' Strain.*

*Source.*—A range mare, animal No. 75.—When first examined, on September 25, 1907, the whole of the visible vaginal mucous membrane presented a mottled, copper-coloured hæmorrhagic appearance. Trypanosomata were present in fair numbers. In October there was œdema of the perinæum, labia pudendi and vaginal mucous membrane; trypanosomata were still present in the fluids of these swellings, but have never again been detected. From November, 1907, to June, 1908, the mare kept in fair condition and appeared pregnant. On June 22, there were signs that the mare had foaled, and on searching the pasture the foal was found, dead. In the next few months the mare lost rapidly in condition, but in December, 1908, commenced to improve and has now regained an apparently normal condition.



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*Inoculations in small animals.*—Six mice, a porcupine and a vole were inoculated with the fluid from the vaginal mucous membrane and œdematous swellings; trypanosomata were known to be present in the inoculated fluid, but were never recovered from these animals, neither were any signs of infection ever to be observed.

*'D' Strain.*

*Source.*—A range mare, animal No. 82.—When first examined, on September 25, 1907, the labia pudendi were tumefied and the vaginal mucous membrane showed infiltrated patches. In October, trypanosomata were found present in the vaginal fluids. In November there was œdema of the lower surface of the abdomen, which, in December, extended along the under side of the chest. In February, 1908, the vaginal mucous membrane was again oedematous and trypanosomata were again detected in the fluids. A return to normal followed and has been maintained for a period of one year, up to the present time.

'D' strain is probably identical with 'C' strain. Both mares, No. 75 and No. 82, and six others, all from the same breeding establishment (D. J. W.), were found affected at the same time, when the stud, consisting of about 80 animals, was examined on September 25 1907.

A Clydesdale stallion, No. 40, that stood for service with this stud during the season of 1906, showed slight symptoms a few months later and died from dourine in March, 1907, the disease running a sub-acute course without intermission.

*Inoculation.*—Traces of vaginal fluid (blood and mucous), containing trypanosomata, were inoculated into the vaginal mucous membrane of a filly, No. 67. This filly had previously received treatment with serum ('A' strain) with the object of conferring a passive immunity. The inoculation of trypanosomata was made on February 3, 1908, and apparently failed, for no sign of infection could be traced. On August 27 and 29, 1908, the filly was reinoculated with 'E' strain of dourine, but up to March 31, 1909, still maintains immunity.

*'E' Strain.*

*Source.*—The stud of Mr. R. T——n, Lethbridge.

*Natural transmission.*—A Clydesdale stallion, No. 35, became infected and transmitted the disease to a number of mares during the covering season of 1906. It was not until late in that year that the first symptom in the stallion—a slight and intermittent swelling of the sheath—appeared and aroused suspicion. The disease advanced tardily until August, 1907, when it became very active, its course marked by extensive œdematous swellings, eye symptoms, weakness, emaciation and death on February 25, 1908.

In the meantime it had been discovered that 4 mares in Mr. T——n's stud and 7 outside mares, covered by this stallion in the season, 1906, were suffering from dourine. It is probable that the stallion was himself infected by one of these 7 outsiders. Of the 11 mares 6 were destroyed, 2 died from dourine (although in one a diaphragmatic hernia very possibly contributed to the cause of death), and the remaining 3 survive, 2 of which, No. 47 and No. 52, have apparently recovered, the other, No. 36, being in an advanced stage of disease.

A stallion that covered mare No. 36, subsequent to the covering by stallion No. 35, became infected and transmitted the infection to another outside mare, No. 96, which was destroyed in consequence. The stallion was castrated, but died, showing symptoms of dourine some months later.

It was in mare No. 36 that the first proof positive of the nature of Canadian dourine was established, from the discovery in the vaginal fluids, by Dr. Gallivan and



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myself, on February 11, 1907, of the casual agent, *trypanosoma equiperdum*. A full account of our observations upon this mare have been published, and it is only necessary to add that nervous phenomena have predominated throughout the course of infection which has endured for the space of nearly three years. The mare improved in general condition during the summer of 1908, but lost it the following winter and has never regained a proper equilibrium or muscular co-ordination. Trypanosomata were found at rare intervals from the 6th to the 13th month of the disease, never afterwards.

*Artificial Transmission, First Series.*

(1) *Animal No. 39*, a filly foal (the dam of which, No. 25, suffered from a severe type of dourine).

On February 11, 1907, she was inoculated with trypanosomata from mare No. 36. An incubation interval of ten days followed; an œdematous swelling at site of inoculation then developed, in the fluid of which trypanosomata were present, and, in addition, spores of the muscular parasite, sarcocystis. The infection ran a sub-acute course and was marked by a single plaque, enlarged glands, progressive paralysis, frequent micturition, œdema of the genitalia and undersurface of abdomen, emaciation and death on June 29, 1907, in the 5th month of the disease.

(2) *Animal No. 29*, a filly foal (the dam of which, No. 28, died from dourine, 'B' strain), was inoculated in February and March, 1907, subcutaneously and intravaginally. The incubation interval that followed the former was, apparently, one of nineteen days, the latter, forty-nine days. Trypanosomata were found present at intervals during May, June, July, August and October, 1907. The glands became enlarged but the parasites were not seen in preparations of the gland juice. Up to this time the symptoms had been very slight and vague. There was no vaginal discharge and only a slight tumefaction.

In December, 1907, a severe attack of strangles came on, towards the end of which there developed a marked knuckling over of the metacarpophalangeal articulations. The animal recovered from strangles, and for the next six months easily tolerated the dourine infection, neither symptoms nor parasites being observed.

On August 7, 1908, 5000 c.c. of blood was drawn from the jugular vein; the operation was followed four days later by a period of plaque eruption (see Table I), lasting fifty-five days, during which fourteen plaques were noted and trypanosomata frequently detected. Also, at this time, eye symptoms were manifested—sensitiveness to light, watery discharge, dimness and swollen lids. A return to normal condition and apparent health quickly followed and has been maintained up to the present time.

(3) *Animal No. 41*, an aged 'cayuse' mare, was subsequently inoculated on February 17, 1907, with trypanosomata from mare No. 36. One hundred and forty days later the parasites were recovered from the blood and fluids of a slightly swollen vagina and continued present at intervals for a period of three months.

On August 2, 1907, 10 c.c. of the serum of dourined stallion No. 33, 'A' strain was injected under the skin and gave rise to a marked local reaction. At the 8th hour the swelling measured 7 by 10 inches; it then diminished in size and was completely reduced at the 36th hour. At the 48th hour it recurred, flat and circumscribed, obtaining a diameter of 4 inches and was again completely reduced at the 72nd hour.

After an interval of 45 days a similar dose of serum of dourined stallion No. 72 was injected, the serum, as in the previous experiment, being first passed through a sterile Chamberland filter. A swelling followed, reaching its maximum, 7 by 9 inches, at the 24th hour; only a trace of it remained at the 48th hour. On the 3rd day the mucous membrane of the left nostril was hæmorrhagic and discharged a thin, blood-



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tinged fluid. A febrile reaction did not occur in either experiment. During the period covering these experiments clinical symptoms were extremely vague; but, rarely, a few trypanosomes were found in the vaginal fluids.

The effect of injections of these sera in healthy equines was studied in two fillies, one receiving a dose of 20 c.c., the other a dose of 30 c.c., double and treble the amounts given above. In the one there was no swelling or rise in temperature, though a slight stiffness of the limb was apparent (the injection was made in the gluteal region) from the 12th to the 24th hour. In the other there was a rise in temperature of 1.6 degrees and a flat swelling, 8 inches in diameter, between the 8th and 10th hours, which was very rapidly absorbed.

Continuing, with animal No. 41, from October, 1907, until April, 1908, the infection remained quiescent. On April 14, trypanosomata reappeared in the vagina and the labia pudendi became markedly œdematous. The paroxysm was a brief one and nothing of note occurred until August 13, when the first plaque appeared. There followed a period of plaque eruption of 94 days in which 29 cutaneous swellings were noted, trypanosomata being detected in the fluids of a number of them.

There was some failing in condition during this term, but the normal was quickly recovered, October, 1908, and has not again been interrupted.

The sequence of events in connection with the infection of this animal is then, briefly, a prolonged incubation interval, three months of activity, reaction to serum injections, six months quiescence, a brief recurrence, three months quiescence, three months marked activity (plaques), and again a long interval of uninterrupted health, still enduring.

(4) *Animal No. 43.*—This two-year-old gelding was subjected to a venous transfusion of blood from mare No. 36; it was estimated that at least 600 c.c. of blood passed into the circulation of the gelding. Date of transfusion, April 24, 1907. On July 22, enlarged glands were detected and punctured; examination of the juice was negative. On September 2, clinical symptoms characteristic of dourine appeared,—loss of muscular co-ordination, knuckling of the hind fetlocks and articular crepitations.

A serum test was made on September 17, 10 c.c. of serum of stallion No. 72 was injected under the skin and a local reaction followed. The swelling obtained its maximum at or about the 24th hour, 6 by 7 inches. It was completely reduced at the 48th hour.

The symptoms mentioned above continued intermittently until March 1908, and, at one time, for a period of two or three weeks, paralysis of the hind-quarters was threatened. In April the condition was normal.

*Blood-letting test.*—The apparent recovery was tested on August 14 by withdrawing 8000 c.c. of blood. No recurrence followed and the recovery has been maintained up to the present, or for a period of over one year. During the course of infection cutaneous symptoms were never presented and trypanosomata were never seen in the blood.

(5) *Animal No. 70.*—This filly, two and a half years of age, was inoculated, October 4 and 8, 1907, under the vaginal mucous membrane, with traces of trypanosome, containing fluids from the vaginae of experimental animals Nos. 29 and 41. The incubation interval was about 14 days. The primary symptom was œdema of the mucous membrane in the region of the inoculation. In this fluid trypanosomes were present in vast numbers. One month later the parasites were still present, though the appearance of the genitals differed but slightly from the normal. On January 25, 1908, the examination of six preparations of vaginal blood and mucous was negative, but after a thorough irrigation of the canal with a sodium citrate solution a very few trypanosomes were discovered. The last observation of the parasites was made upon



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February 1, there was then œdema of the skin under the abdomen. In March the filly received three doses of atoxyl. Symptoms rapidly disappeared and health returned.

*Blood-letting test.*—On September 10, 1908, 5000 c.c. of blood was withdrawn. No recurrence followed and recovery is apparent, one year after treatment and eighteen months after inoculation.

(6) *Animal No. 69.*—A three-year-old filly, inoculated in the labium pudendi, on August 27, 1908, with a trace of trypanosome—containing fluid from a plaque, filly 29. Incubation interval, eighteen days. The primary symptom was a very pronounced swelling of the labium. Trypanosomata were very numerous. The swelling, which was at first tense and warm, soon became cold and œdematous; it persisted for seven days and was then rapidly reduced, but recurred after intervals of 6 days, 30, 35 and 33 days, respectively. The course of the infection for the first 7 months was thus marked by five definite paroxysms, in each of which, in the œdematous fluids, trypanosomata were found present, usually in great numbers. The fifth intermission is now continuing. The temperature was not recorded for the animal proved a very difficult one to handle. The symptoms have been strictly local and no failing in general appearance and condition has been noted.

(7) *Animal No. 3f.*—A horse foal, inoculated, subcutaneously, on August 16, 1908, with fluid from a plaque, filly 29. The series of events is described in detail under 'treatment.'

*Summary.*—Incubation interval, 29 days. Primary symptom, œdema at point of inoculation. Subsequent paroxysmal fever, œdema of the p. sheath; eye lesions and enfeeblement. Treatment, a course of atoxyl, followed, after an interval, by a course of atoxyl and Donovan's solution.

*Result.*—Recurrence of paroxysmal fever, eye symptoms; a progressive enfeeblement.

(8) *Animal No. 5f.*—A filly foal, inoculated on August 26, 1908, when one month of age, with trypanosome, containing fluid from a plaque, filly 29. The inoculation was given under the skin, in the region of the middle ribs. Three months went by without an indication of infection being observed. Unfortunately the temperature was not recorded during these months. Commencing early in December and continuing to date, an almost constant elevation of temperature has been the rule; only to a slight degree has it appeared paroxysmal.

On the 113th day after inoculation the first local symptom was presented, namely, a very pronounced swelling of the labia pudendi, a condition which recurred again and again, at first with marked regularity, the periods of eruption, reduction and quiescence being clearly defined. Gradually the tumefaction changed its distinctive character, becoming more chronic and fluctuating, but neither obtaining the same extent as formerly nor quite reducing to the normal limit.

From this swelling and from the vaginal mucous membrane trypanosomata have frequently been obtained, and, as in the development of a plaque, at a certain stage they are present in great numbers, though it is for a very short period, a few hours at the most.

The growth and development of this young animal has been apparently unhindered by infection; it is noteworthy that, as in the case of No. 69, apart from temperature, œdema of the vulva and first portion of the vagina constituted the only visible and definite symptoms of the disease.

(9) *Animal No. 1f.*—A filly foal, inoculated on July 30, 1908, when two months of age, with 60 c.c. of blood from the main circulation of mare 36.

For four months no symptoms were observed, but the temperature was not recorded. In December, commencing on the 143rd day after inoculation, there



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occurred a paroxysm of fever. There was still an absence of local symptoms when, on January 8, 1909, the filly was reinoculated, intralabially, with trypanosomata from the swollen labia of foal 5f.

After an interval of 12 days the characteristic swelling developed at the point of inoculation and in preparations obtained trypanosomata were to be seen in rosettes and agglomerations, as many as 18 parasites in a single cluster.

Exacerbations and remissions of this local symptom followed in much the same order as in the case of foal 5f, and besides there being a slight but more or less constant elevation of temperature, pronounced paroxysms of fever recurred with a similar regularity to those of foal 3f.

In the 9th month after the first inoculation the hind limbs showed weakness and nervous irritation. In the 10th month the lymphatic glands became much enlarged. With these exceptions there is but slight, if any, variation from the normal in the development of this animal and its present condition as a yearling filly.

(10) *Animal No. 6f.*—A filly foal, inoculated on March 9, 1909, when 7 months of age, intralabially, with trypanosomata from the swollen labia of foal 1f, this being the 5th (V) passage in succession of 'E' strain.

Nine days intervened between inoculation and œdema of the labium pudendi. At the end of the 1st day of the eruption a vast army of trypanosomes had developed and were attacked by macrophage cells. The destruction of the parasites was very rapid, but not complete, for a very few were found present day after day. It was not uncommon to observe a single phagocyte that contained the remains of as many as five trypanosomes.

The temperature was slightly elevated from the 13th to the 22nd day after inoculation, and then rose rapidly; paroxysms followed one another in close succession, the fever being remittent rather than intermittent.

A rapid failing in condition ensued, with marked enfeeblement. The eyes are dim and the lids much swollen; the glands are exceedingly prominent.

The infection is evidently a severe one and running a continuous, sub-acute course.

(11) *Animal No. 7f.*—A filly foal or yearling (11 months old), received the 6th passage of 'E' strain. The incubation interval was reduced to 6 days. The course of infection resembles that in the preceding case and the observations made are very similar.

*Inoculations in small animals.*—The following table indicates the numbers and kind of small animals inoculated with 'E' strain:—

—		Dogs.	Cats.	Rabbits.	Rats.	Mice.	Gophers.
Stallion, No. 35	.....			4			
Mare " 36	.....	8	2	10		16	2
" " 41	.....				2		
Filly " 29	.....			3		?	
" " 69	.....				3		
Foal " 3 f.	.....				2		
" " 5 f.	.....				2		
" " 1 f.	.....				5		
" " 6 f.	.....			2	8		
" " 7 f.	.....			3	3		
Total numbers.....		8	2	22	25	18	2

## Period of Observation—

Shortest.—2½ mths., 1 mth., 1 mth., 15 days, 5 days, 15 days.

Longest.—16 mths., 2 mths., 16 mths., 9 mths., 12 mths., 1 mth.

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The various methods of inoculation were employed. Not infrequently, and especially with the rats, the material injected was known to be rich in trypanosomata. In a number of animals the inoculation was repeated one or several times; occasionally, sub-inoculations were made from dog to rabbit, from rabbit to rat and from rat to rat. Nevertheless the dourine parasite was never recovered from any one of these animals and not a single positive result has been obtained.

In three dogs very slight changes occurred in the sexual organs and in the eyes. Ill-defined eye lesions were also noted in several rabbits. Quite recently two rats have exhibited paralytic symptoms in the hind legs. These few indications are rather suggestive that the attempts to convey the infection to animals other than the equine species, though apparently unsuccessful, may not absolutely have failed.

It will doubtless be remarked that these observations are in accord with those of Marek on Hungarian dourine and of Motas on Roumanian dourine, and that this Canadian variety differs but little from the European though very markedly from the Algerian and Indian varieties.

*Variations in Virulence*, for horses, of different strains of dourine and varying susceptibility and tolerance shown by individuals.

It may be seen from the foregoing that—

‘A’ strain, proving fatal to a naturally infected stallion and mare, is easily tolerated in an artificially infected filly.

‘B’ strain proved fatal both to the naturally infected mare from which it was obtained, and to an artificially infected filly.

‘C’ strain produced severe symptoms in a naturally infected mare, but, later, became well tolerated, and may have died out.

‘D’ strain, similar to ‘C’ strain, though productive of a characteristic group of symptoms in a naturally infected mare, did not prove fatal. A filly, protected with the serum of an animal infected with ‘A’ strain, successfully resisted artificial infection.

‘E’ strain proved fatal to 2 stallions and to 2 of 11 mares (6 of the latter being destroyed, 3 surviving), all naturally infected. Of 11 equines artificially infected, 10 survive, the strain proving fatal to one, severely pathogenic to 4 and fairly tolerated by the remainder; 2, at least, apparently recovering normal health.

It is significant that every one of the equines inoculated, other than recovered and protected animals, sooner or later exhibited symptoms clearly indicating dourine, and in all save one, a gelding, the infection was proved by ascertaining the presence of trypanosoma equiperdum; in the majority of cases the course of the disease could be traced by noting the periodicity or recurrence of characteristic pathological formations and their associations with trypanosomata.

However, the *incubation interval* or lapse of time between inoculation or infective covering and the determination of trypanosome activity, as well as subsequent events, varied greatly in adult animals. In the two cases (No. 26 and No. 27) inoculated with the blood of a stallion and a mare in the final stages, probably the 16th and 17th month, respectively, of natural dourine, clinical symptoms were very late and ill-defined and trypanosomata not found until the 21st month in the one, and the 10th month in the other, after inoculation. Those two animals, it is worth noting, were the first of the equines that it was attempted (November, 1906) to artificially infect with Canadian dourine by direct inoculation of blood, the inoculations proving, eventually, to have been successful, though very late in being recognized as such. The other extreme is shown in the cases of those most recently infected (1909), the filly foals Nos. 6f and 7f, in which the incubation intervals were only 9 and 6 days, respectively, very definite recurrences of clinical symptoms and paroxysms of fever following.



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These foals obtained their infective material from others in only the 2nd month of infection during periods of marked trypanosome activity.

It seems possible, therefore, that by successive and *early* passages of the dourine parasite from horse to horse the incubation interval is reduced and virulence increased.

NOTE.—Since the above was written another inoculation has been carried out in a young horse-foal, the incubation interval shortening to five days.

## IMMUNITY.

*Natural immunity and susceptibility.*—We have seen that varying degrees of natural resistance, tolerance and susceptibility to dourine infection may be met with in individuals of the horse-tribe, though not one has been shown to possess an absolute immunity. There is the possibility, however, that where tolerance is shown, in some cases, at least, it may be due rather to a weakened virulence of the trypanosoma than to the natural resistance of its host.

The filly foals Nos. 29 and 39, artificially infected at the same time and from the same source, were born to dourined mares Nos. 28 and 25, respectively; in the former, the mare died from dourine and her foal recovered, while in the latter the results were reversed, the foal succumbing in the fifth month of infection, the mare making a remarkable recovery.

Foals Nos. 3f, 5f, 6f and 7f, were born to mares that had apparently recovered from dourine and were sired by a healthy stallion. All the foals were susceptible, the infection being most severe in the horse-foal No. 3f (the others are fillies) and in accord with other observations that the unaltered male is more susceptible than the female and rarely survives infection.

The natural immunity, or otherwise, of the offspring of mares actively immunized has not yet been studied.

*Acquired immunity, active (a) and passive (b).*

(a) Mares that have recovered from dourine possess a high degree of resistance to reinfection.

The following, Nos. 9, 7 and 17, are said to have been suffering from dourine about the year 1904. Nos. 9 and 17 were covered, in 1906, by dourined stallions. In the winter of 1906-07 all appeared healthy. Nos. 9 and 7 were inoculated in February and No. 17 in May and October, 1907. In No. 9 trypanosomata were recovered 85 days after inoculation. Clinical symptoms were limited to the sexual organs and were disappearing in September, 1907, when a serum injection brought on a recurrence. Characteristic dourine conditions were to be observed up to the end of that year, the mare becoming very ill indeed. Recovery, in 1908, was rapid, though eye lesions persisted for a considerable time. In No. 7 the inoculation was apparently unsuccessful, no sign of disease following; in No. 17, the only suspicion rested on slight eye lesions. No. 7 was again inoculated, May 21, 1909, and on the same date No. 17 received her fourth inoculation, being in the 10th month of pregnancy—the third inoculation had been made during the sixth month of pregnancy—but no sign of infection has been detected in either mare, and, after a normal term, a strong and healthy foal has been born to No. 17.

Covering the whole period of these attempts at reinfection in mares 7 and 17, and for nearly a year in mare 9, one could only remark upon their perfect health and condition.

One other case must be mentioned, that of a young mare, No. 48, showing mild symptoms of dourine in May, 1907. The infection was well tolerated and recovery appeared to have taken place before the end of the year. One year was allowed to



elapse, and, no sign of a recurrence being noted, inoculations of dourine blood were made subcutaneously and intralabially, December 5, 1908, and intravaginally, February 4, 1909, all of which have apparently failed.

So, then, reinfection occurred in one mare but was again followed by recovery, and three mares appear to be quite immune.

*Passive immunization.*

(b) Believing that the trypanosoma equiperdum, in the horse, is a tissue rather than a true blood parasite, that its multiplication takes place in the intercellular spaces of certain organs or structures, particularly the sexual, and that the toxins and products of its metabolism occur locally and are then taken up and distributed by the lymph channels and blood stream—I have employed the serum of horses dying from or in an advanced stage of dourine, with a view to prophylaxis—with the idea that the injection of such sera into healthy horses would give protection against dourine infection or produce an anti-serum capable of offsetting such infection.

Two stallions and a mare, each one exhibiting the characteristic œdematous conditions of dourine, furnished the sera which were collected in sterile vessels, stored upon ice and passed through either a Chamberland or Berkefeld laboratory filter before injection.

*Experiment 1.*—A young mare, No. 68, received injections of sera in increasing doses, the last and largest, 300 c.c., being given on January 7, 1908. Inoculation, intravaginal and subcutaneous, April 21, 1908, was not followed by an infection that could be ascertained. Further inoculations in August, were effective, plaques, eight in number, occurring before the end of the year and trypanosomata in the fluid contents. The infection was well borne and without loss in general health and condition. A fourth inoculation, May 21, 1909, was followed by the eruption of a single plaque.

*Experiment 2.*—A young mare, No. 67, received injections of sera as in experiment 1, the last dose being given on January 9, 1908. Inoculations of trypanosomata and dourine blood, February 3, August 27 and 29, apparently failed. Up to the end of March, 1909, no sign of infection had been betrayed or suspected, but in April there occurred under the abdomen an œdematous swelling which came and disappeared within eight days. Trypanosomata were not to be seen in the blood stained fluid which failed to infect rats and rabbits.

*Experiment 3.*—A young mare, No. 71, received a single dose of 90 c.c. of serum on January 7, 1908. In July following, she was bred to a healthy stallion, and, a month later, was inoculated, August 29 (this inoculation, and that of the same date in experiments 1 and 2, being with 100 c.c. of blood drawn during a period of plaque eruption). No evidence of infection followed. The mare's health has not varied from normal and she has recently given birth, after full term, to a strong and well developed foal.

Mares Nos. 66 and 67 were also covered by the same stallion, between the first and second inoculations. The mares did not become pregnant and the stallion was not infected.

In experiment 1, it would appear that the animal was protected for about four months, and, further, that though inoculation in the 8th month was successful, the infection is easily tolerated and may very possibly result in an active immunity.

In experiment 2, the preventive value of the serum was still better indicated; there was not the slightest suspicion of infection for 13 months after the 1st inoculation and for 7 months after the 2nd inoculation and 3rd, that is, for 15 months after the preventive treatment. The recent appearance of an œdematous swelling under the abdomen must be regarded with suspicion and it makes it doubtful whether complete protection was or was not afforded.



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In the above experiments it was positively known that numerous living trypanosomata were inoculated, but in experiment 3 only blood from the main circulation of an animal exhibiting cutaneous plaques was injected and blood so drawn is not always infective. At all events it is unlikely that failure of infection was due entirely to the single protective dose of serum given nearly 8 months previously.

Had laboratory animals, including dogs, shown themselves susceptible to dourine, they would, of course, have been used during the above experiments for subinoculations, but as they have always appeared refractory throughout this investigation, it would have been useless work to have employed them for the purpose of testing an apparent immunity or recovery. The expense of using healthy horses to the number required would have been great, and, even had it been done, failure to infect them could not have been accepted as a criterion of absolute immunity or permanent recovery, for the parasites of dourine, if they are retained, are more likely to have their resting place somewhere in the tissues than in the blood system.

There is considerable discrepancy of opinion as to immunity from dourine, due, in great measure, to the variations in virulence of the several varieties on which observations and experiments have been carried out in the different countries and laboratories. Instances of local and general immunity have been recorded (Nobarro's Edition of Laveran and Semail's 'Trypanosomes et Trypanosomiasis'). The immunity produced in dourine in an organism in the natural process of recovery is an active one, brought about by phagocytosis, that, due to drug treatment, is more in the nature of a tolerance and not lasting. The results of investigation into immunity in dourine, by Uhlenhuth and Woihe (Sleeping Sickness Bulletin No. 4, page 143, abstracted) were negative. They have not been able to immunize animals actively or passively, their strain being a very lethal one.

## REMARKS ON THE PARASITE OF DOURINE.

(1) *Is trypanosoma equiperdum a true blood parasite?*

When vast numbers of trypanosomata, several in each microscopic field, have been present in œdematous fluids from the sexual organs or from plaques, a careful search of the blood from the tips of the ears, from the tail and from the main circulation has, in my hands, always been in vain, and, similarly, when examining pure blood taken at frequent intervals covering attacks of fever as well as during the intermissions. The fact that the inoculation or direct transfusion of a large amount of blood is sometimes infective does not, I think, necessarily indicate that the trypanosome is developed in the blood stream, but, coupled with other facts, rather that it has escaped destruction elsewhere and been carried there along with the fluids that are so rapidly formed and absorbed in the local areas in which, especially in the early stages of infection, the parasites develop in such great numbers. The sparseness or absence of parasites in the main circulation has been commented upon by all who have searched for them there, even in equines infected with the most virulent strain of dourine. Thus, Lingard states: 'Except during the height of the eruption of plaques it is unusual during the course of dourine, to find on microscopical examination, the mature trypanosoma in the blood of the general circulation... in an animal where the plaques are numerous, when one or more of them are in constant process of change, and their contents are being frequently voided into the general circulation, the inoculation of that animal's blood into susceptible animals is then of a positive character, ... whereas during a long intermission a dose 100 times as large... may prove unsuccessful.'

The natural course of dourine in the horse is a very chronic one and, in the earlier stages, is usually sharply defined by an alternation of augmentation and diminution

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'Report on Dourine,' by A. Lingard, 1905.



of œdematous swellings, involving the external genitals and very intimately related with the alteration of presence and absence of trypanosomata in the fluids of tissues of those organs and with paroxysms of fever.

A local inoculation of trypanosomata, particularly in the labium pudendi, is followed by a secondary swelling, the parasites developing 'in situ,' and, usually within 24 hours of the maximum, that is, when the parasites are most numerous, there is a rapid rise in temperature. Shortly after the maximum is reached the parasites are rapidly destroyed and large numbers of macrophage cells may be seen containing the remains of many trypanosomes. The contents of the swelling are gradually absorbed, but seldom before complete reduction does the temperature return to normal. The above phenomena may recur and be witnessed again and again at intervals of from a few days to several weeks during the first few months of infection. In the mares and fillies, less so in the male sex, a paroxysm of fever can almost invariably be associated with tumefaction of the genitals, but I am unable to support the view that it is due to a migration of trypanosomata from their local situation and their fresh development in the blood stream. On the contrary, I believe that the fever, and, later on, and to a great extent, the lesions of the central nervous system, are due to the toxins that are taken up and distributed by the blood. As stated elsewhere, plaques are not a common feature of the Canadian variety of dourine; in the few animals in which I have witnessed a succession of plaques, the eruption was not associated with definite paroxysms of fever, but with a slight and more or less persistent elevation of temperature. This might be explained, in part, from the fact the plaques occur in a comparatively late stage of infection and when reaction to the toxins is less marked or of a different nature, and in part, that the area involved in a plaque and the total number of parasites that develop there is probably very much less than that in the sexual organs. Little or nothing is known of the development of *trypanosoma equiperdum* in the internal organs of the horse; it is significant that microscopical examinations of the internal fluids or tissues of horses destroyed in different stages of the disease or of those dying from it, are almost invariably (in my hands, always), negative in searching for the parasite.

According to Lingard (*loc. cit.*), in animals succumbing to an acute attack of the disease, accompanied by nervous symptoms, developmental forms of the trypanosome occur in the cerebro-spinal fluid.

Some conclusions drawn by Laveran and Mesnil<sup>1</sup> with reference to the normal habitat of the dourine trypanosome appear open to question. These observers state that 'the fluid which escapes immediately after puncturing the œdematous swellings or plaques appears not to contain the parasite, but if this fluid be tinged with blood the parasite may be found in it, and the more blood there is present the more numerous are the trypanosomes. Two conclusions may be drawn from these facts; first, that *the trypanosome is a true blood parasite*; and, secondly, that very probably the swellings and cutaneous plaques are due to embolism caused by masses of the parasite blocking the small blood vessels.'

A photomicrograph of an embolism produced as described above would be of much interest and should not be very difficult to obtain if it really exists, but no one, so far as I am aware, has ever actually observed such an embolism in microscopical sections of the tissues involved. No such condition exists in the sectional series that I have prepared from small portions of tissues removed from the living animal, these portions being from œdematous areas and containing numerous trypanosomata, as was ascertained previous to removal, by puncture and examination. As to the observation that the more blood there is present the more numerous are the trypanosomes, I have to give a quite contrary experience. In the many hundreds of preparations that I have examined I have invariably found that the less blood there is present the more numerous are the parasites. In the stained specimens containing the greatest

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<sup>1</sup> Nabarro's Edition of Laveran & Mesnil's '*Trypanosomes et Trypanosomiasés.*'



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abundance of parasites, occurring singly, in pairs and together in agglomerations, one may search for quite a time without finding a single red blood cell. In one specimen containing thousands of trypanosomes I am unable to find one red cell. These preparations, however, contain large numbers of leucocytes, principally mononuclears and lymphocytes, and macrophage cells; various stages of the inclusion and digestion of trypanosomes may be seen.

(2) *The role of phagocytosis in dourine.*

Leucocytosis of the blood in trypanosome infections has been noted by many observers, but rarely connected with the fate of the parasites. Laveran and Mesnil found that the leucocytes of immunized rats engulfed living trypanosomes (*T. lewesi*). Uhlenhuth and Woithe consider that phagocytosis plays no role in the killing of the parasites (dourine)<sup>1</sup>, Yakimoff agreeing that there is no direct connection between the leucocytosis and disappearance of the trypanosomes. That the parasites in trypanosomiasis of Gambrian horses underwent phagocytosis was suspected by Thiroux and Teppaz.<sup>2</sup>

A very active phagocytosis, sometimes associated with agglutination, occurs in the cutaneous plaques and œdematous swellings of the genital organs, in the horse. I have observed it repeatedly in fresh preparations and then added confirmation that the phenomena occurred 'in situ' and not 'in vitro' by staining and examining preparations smeared at the moment the fluid escaped from the puncture and dried instantaneously.

Phagocytosis takes place for but a very brief period and only when a certain stage in the multiplication of the trypanosomata is reached, that is, just at or closely after the maximum. In order to make the observation the animal must be kept under constant watch and the œdematous swelling, as soon as it becomes apparent, punctured with a very fine needle; it is important to interfere as little as possible with the swelling, to draw off only sufficient fluid necessary to make the examination and not to puncture a blood vessel, for the escape of blood into the part not only dilutes the œdematous fluids, making the search for the parasites more tedious, but seriously alters the course of events. The period of time between the commencement of the swelling and the highest stage of multiplication of the parasite seems to vary considerably: it may be but a few hours or it may extend to two days or over, so that it is often necessary to repeat the examination at frequent intervals. In proportion to the increase in numbers of the trypanosome so do the leucocytes invade the part, probably supplying the agglutinating substance, for at about the time of the maximum the parasites may be seen in agglomerations, posterior extremities centrally, flagella peripherally; individually, they assume the club-shaped, tadpole or stumpy forms; the macrophages now take up their role, engulfing both leucocytes and trypanosomes, the latter being digested so rapidly that in a few hours not even their remains can be made out. It is worth mentioning, moreover, that these ravenous cells appear to be responsible for the leucodermic patches that are so frequently associated with recurrences of genital tumefaction, at least, they carry away the colouring matter from these denuded areas. When depigmentation first occurs, the œdematous fluid of that part contains vast numbers of macrophagus loaded down with blackish granules; in smearing the fluid many of the cells are ruptured and masses of their granular contents may be seen lying about them.

I have found it more difficult to observe phagocytosis in the plaques than in the œdematous areas of the vagina, anus, and labia pudendi, and that it can best be studied in the latter and during the occurrence of the secondary swelling that follows inoculation or in the first and second recurrence of it. It is a curious fact that

<sup>1</sup> Sleeping Sickness Bulletin, No. 4, pp.143 and 150.

<sup>2</sup> Thiroux & Teppaz.—'Animal Trypanosomiasis in Senegal.' Jour. Trop. Vet. Sci., Vol. II, No. 4, p.421.



at this time, that is, the earliest stages of infection, the parasites have appeared in far greater numbers than, with few exceptions, ever afterwards. Further, all my observations of phagocytosis have been made in mares and fillies, in cases very chronic but not one as yet fatal.

I conclude that in cases of active immunity in dourine the process is brought about by phagocytosis and in association with agglutination. Dourine in Canada is remarkable for its great chronicity and intermittent character; we seldom see a case of acute infection. In other countries, in animals infected with one of the more virulent varieties, and in rats and mice in which, from all accounts, infection is always acute, phagocytosis does not play any notable part, probably. It would appear that the more virulent the strain the more capable it becomes of living in the blood stream. Observations on the trypanosomata of Canadian dourine do not lead one to regard them as true blood parasites, but rather that the few occasionally present in the blood have been brought there with the overflow from reservoirs or active colonies, situated outside of that medium, in the sexual organs, mucous membranes, in or beneath the skin, the humours of the eye, &c. It is not unlikely that a somewhat similar distribution may occur in other trypanosome diseases of man and domesticated animals, affording a possible explanation of the failure of drug treatment in large animals aiming at disinfection of the blood, which appears more or less successful in curing infections in rats and mice in which the trypanosoma is more distinctly a blood parasite.

(iii) *Vitality of trypanosoma equiperdum under artificial conditions.*

All observations given below were made upon cover-glass preparations sealed with vaseline.

Trypanosome—containing fluid.	Dilutant.	Temperature.	Longest duration of life.
			Day.
Vaginal secretion.....		22° C.....	1¼
Oedema fluid.....		22° C.....	1
“.....		On ice.....	1½
“.....	Citrate solution.....	22° C.....	1½
“.....	“.....	On ice.....	3
“.....	Blood of mouse.....	22° C.....	1¼
“.....	Serum of rabbit.....	22° C.....	1½
“.....	“ healthy horse.....	22° C.....	1½
“.....	“ dourined “.....	22° C.....	1½
“.....	“ ‘locoed’ heifer.....	22° C.....	3
“.....	“.....	37° C.....	2
“.....	Extract of testicles.....	22° C.....	1
“.....	“ spleen.....	22° C.....	1½
“.....	“ liver.....	22° C.....	1½
“.....	“ lymph glands.....	22° C.....	1½

As a result of these observations, repeated one or more times, it was surprising to find that the trypanosomata lived longest, at room temperature, in the serum of a heifer that was showing symptoms of ‘loco’ disease. Further, in these preparations, equal parts of oedematous trypanosome, containing fluid and serum, the parasites retained their power of actual locomotion up to 60 hours, moving in and out of the microscopic field, and, had it not been for the contamination with bacteria, life would probably have been further prolonged; as it was, they continued to writhe and squirm up to the 72nd hour.

Diluted with citrate solution and kept on ice, a similar length of time elapsed before complete immobility. But in this solution and in all of the others tried, apart



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from the serum of the heifer, in less than one hour the parasites had ceased to move from place to place. They kept their position, struggling with a leucocyte or with one another, never multiplying but rapidly becoming less and less in number. In the preparations containing the serum of the heifer, at times, pairs of undersized but exceedingly active trypanosomes were seen, so rapid were their movements that they could scarcely be kept within the field of view and it was thought that multiplication was actually taking place.

Attempts to cultivate the trypanosome upon blood-agar and upon agar prepared with extracts of the liver, spleen, testicles and lymph glands were all unsuccessful.

## DIAGNOSIS.

*The Plaque, or cutaneous symptom of Dourine and its position in the diagnosis of the disease.*

The plaques or patchy infiltrations of the skin have been given a position of such paramount importance in the clinical manifestation and diagnosis of dourine, that it seems necessary, in this present communication, to include observations upon this classical sign.

While it appears unquestioned that plaque-eruption is the most generally marked symptom of the disease that it is 'the only pathognomonic symptom' meets with some qualification.

Lingard says: 'It is not absolutely pathognomonic, as an animal may pass through an attack and eventually succumb to paralysis and the trypanosoma be demonstrated in other fluids, without the animal exhibiting any cutaneous symptom.'

Pease, in describing a disease simulating dourine caused by *Filaria*, states: 'It is not by any means an uncommon thing to witness the appearance of plaques closely simulating those of dourine on various parts of the skin, and nothing to account for them but the presence of numerous filarial embryos in material taken from them by puncture.'

According to all accounts, in Algeria and India, in the course of dourine there is usually to be observed an eruption of plaques occurring singly or in successive crops and during a period which it is frequently possible to subdivide into alternating periods of paroxysm and intermission. Laveran and Mesnil (Schneider and Buffard) give this period as commencing forty to forty-five days, some times two months, after the infecting coitus. In Lingard's cases plaques appeared in the majority of instances in mares and in a few stallions from the 24th to the 34th day after the first covering or inoculation, while in the majority of stallions they appeared at a much later date. Lingard gives the total number of plaques observed in 13 equines as 443, an average of about 34.

A stallion at the Imperial Bacteriological Laboratory, Mugtesar, India, presented 156 cutaneous plaques during the course of its illness.

A peculiar case of plaque eruption in a stallion—'ulcerous plaques, analagous to those of syphilis in man,'—is reported from Roumania by Motas, whom I quote as follows:—'On July 26, . . . . . In the region of the metacarpal phalangeal articulation there existed a plaque. After two months, there existed a plaque on all the limbs in the region indicated; they were rounded in form, of a granular aspect; the borders ill-defined; on the surface there was a little purulent secretion. The largest did not exceed that of a 5-franc piece. On the metacarpo-phalangeal articulations of the front and hind left limbs, the plaque persisted until the death of the animal (24 Oct., 1908), resisting entirely the treatment employed during three months. We also observed, on the external face of the anterior limbs, nodular eruptions which developed later into little abscesses.' Trypanosomes were found in the œdema of the sheath; it is not stated whether they were in evidence in the fluids of 'ulcerous plaques.'



Dourine, in the different countries in which it exists, varies greatly in virulence. Here, in Alberta, it is, on the whole, much less virulent than in Algeria and India, and the classical symptom—plaque-eruption—less constant, indeed, of comparatively rare occurrence. The period of plaque eruption represents the *second stage* of dourine, the first appearance of a plaque indicating that the parasite is no longer localized to the region of its entrance, but is circulating in the blood or body fluids. This ‘second stage’ or generalization of the disease, however, may be reached and run its course without the presentation of a single plaque, or, again, it may be indefinitely delayed or never reached at all. Local changes—of the genitalia—may be the only signs or symptoms presented during a period varying from a few weeks to many months or several years. These may persist, fluctuate or spontaneously disappear without the sequence of plaques and a general infection.

TABLE I.—Showing the total numbers and the period of eruption of cutaneous plaques. (The table includes all of the experimentally infected equines and a few naturally infected animals that have been under a close and prolonged observation.)

Animal number.	PLAQUE ERUPTION.				Days between inoculation and death.	Survival March 31, 1909.
	Total number of plaques.	Eruptive period. in days.	Day after inoculation.			
			First observation	Last observation		
26.....	1	3	631st	633rd	.....	862
27.....	1	1	235th		513	
39.....	1	4	71st	75th	139	
29.....	14	55	541st	596th		774
41.....	29	94	544th	638th	.....	774
43.....	Nil.				.....	708
70.....	"				.....	543
69.....	"				.....	216
1f.....	"				.....	244
3f.....	"				.....	228
5f.....	"				.....	217
6f.....	"				.....	23
9.....	"				.....	774
7.....	"				.....	769
17.....	"				.....	674
66.....	8	98	18th	116th	.....	216
67.....	Nil.				.....	422
71.....	"				.....	214
(a)						
36.....	8	374	128th	502nd	.....	958
42.....	7	6	320th	326th	340	
21.....	Nil.				.....	869
22.....	"				.....	869
23.....	"				.....	869
24.....	"				.....	869
25.....	"				.....	869
33.....	"				252	
35.....	"				422	
74.....	"				.....	610
75.....	"				.....	552
76.....	"				.....	552
82.....	"				.....	552

(a) *Naturally acquired Dourine.*—For animals 36 and 42 instead of ‘inoculation’ read ‘probable date of infection’ and for the remainder substitute ‘first day of observation.’



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Trypanosomata multiplying at the seat of a subcutaneous inoculation give rise, in from 10—30 days, to an œdematous swelling which may closely resemble a true plaque, but which can only be regarded as a local symptom and not a sign of general infection. For this reason the 'inoculation plaque' figuring in connection with animals Nos. 29, 39 and 3f is not included in the accompanying table (I).

Animals Nos. 7, 17, 67 and 71 have not exhibited clinical symptoms and proof of infection is wanting; these and No. 6f, in which the duration of infection is only 24 days need no further consideration at this time.

Plaque eruption, then, has been witnessed in—

(a) Six out of thirteen equines experimentally infected, and in

(b) Two out of a large number of equines naturally infected. (Many of the latter, however, not mentioned in above table, have not been held under a sufficiently long or constant period of observation to warrant a conclusion that plaques never occurred.)

The total number of plaques witnessed in these 8 animals is 69, and of these—

Eleven plaques occurred between the 1st and 6th month of infection.

Ten plaques occurred between the 7th and 12th month of infection.

Seven plaques occurred between the 13th and 18th month of infection.

Forty-one plaques occurred between the 19th and 24th month of infection.

Again, of the 8 animals that exhibited a total of 69 plaques, 3 presented but a single plaque apiece, 2 presented but 8 plaques apiece, 1 animal presented 7 plaques, 1 animal presented 14 plaques, and 1 animal presented 29 plaques.

In 5 of the surviving experimental equines in which the duration of infection is less than one year, plaque eruption has not yet taken place and may likely occur at a later date.

A case of some interest that might be mentioned here is that of a young mare which has been under the daily observation of one of our dourine inspectors (Dr. M. V. Gallivan) for nearly two years and which I have examined at very frequent intervals. This animal has exhibited 14 plaques, occurring in 4 paroxysms, which, with the intervals between, occupy a period of nearly six months. For at least a year prior to the eruption of plaques the animal had not been covered by a stallion; it is indeed doubtful that the mare has ever been bred at all. She has been used as a light driver or roadster during the two years of observation and has made many long, exhausting trips, but no clinical symptom of dourine other than the plaques has ever been noted. The puncture fluid of five of the plaques I carefully searched, without finding a trypanosome or anything to account for their presence.

The case of animal No. 26 is especially noteworthy. This filly received three separate inoculations of the blood of an infected stallion. On the 631st day following, in the 21st month, a single plaque appeared. Trypanosomata were then demonstrated in the œdematous fluid obtained on puncture. During the course of infection the filly has usually presented a rather undernourished condition, and, rarely, a slightly stiffened muscular action, but neither before nor since the eruption of this lone plaque have clinical symptoms been noted and on no other occasion were trypanosomes found present.

The eruption of fourteen plaques on animal No. 29 commenced after a profuse blood-letting, upon the 4th day following the operation, and was probably induced by this means. This eruption and that of twenty-nine plaques on animal No. 41 was very typical, though not occurring until after the 18th month of infection, and was closely watched and studied.

Regarding the position of these 43 plaques, 18 of them occurred upon the right side, 12 upon the left, 6 under the abdomen, 3 under the chest, 2 in the region of the stifle, 1 on the hind-quarter and 1 on the inner side of the thigh. None were seen upon the front-quarters, the neck, chest or withers.



Five plaques recurred after intervals of 4, 5, 2, 6 and 7 days, respectively.

The average size was from  $1\frac{1}{2}$  to  $1\frac{3}{4}$  inches in diameter,  $\frac{3}{8}$  to  $\frac{5}{8}$  of an inch in thickness or elevation. The great majority of the plaques were not over  $2\frac{1}{2}$  inches or under 1 inch in diameter, though variations from  $\frac{3}{4}$  of an inch to  $6\frac{1}{2}$  inches were met with.

The types or different forms of plaques observed included (a) the 'classical plaque'—'as if a thin disc of metal had been introduced under the skin' (Lingard); (b) the œdematous patch, circular and rounded, pitting upon steady pressure; (c) the œdematous plaque with a flat or hollowed centre and raised periphery; and (d) the crescentic, double and dumb-bell-shaped plaques.

The type of plaque, in my experience, depends to a great extent upon the stage in its eruption in which it is witnessed. If observed early enough it will almost surely possess characteristic features—the firm, unyielding, even elevation of the skin—of the first-named type. But, later on, it may assume one, or in turn, several of the other variations in type or form—modifications of the original type. The latter were never observed to precede or change back to the former, though a plaque may be entirely absorbed and recur at the same spot in its original form.

For convenience in description, the elevation of a plaque may be divided into three stages:—

1. The stage of eruption and augmentation.
2. The stage of transmutation or transformation.
3. The stage of diminution and absorption.

(1) The swelling is circular in outline, has a flat or slightly convex surface and does not yield to ordinary pressure. It is not uncommon to note a considerable emanation of heat from the part; at times there is a slight irritation present, the area may be moist with sweat, the hairs standing out erect; œdema is absent. Early in this stage the fluid contents of the swelling resemble normal blood, becoming increasingly thinned or diluted with plasma as the second stage is approached. Under the influence of sudden and vigorous exercise the evolution of a plaque may be cut short and the swelling be rapidly absorbed, but this is not the rule, the majority of plaques completing their cycle or definite series of events.

(2) The maximum size of the swelling or beginning of the second stage is reached in from 18 to 40 hours after eruption and continues for a period of 6 hours to 24 hours usually, sometimes for several days, with slight fluctuations. The plaque is cold and free from irritation; needle punctures may be made and frequently repeated with but slight objection upon the animal's part. The fluid that exudes or is squeezed from the puncture is quite clear and colourless, or contains but faint traces of blood. The swelling loses its firmness and resistance, becomes more or less œdematous and assumes a different form, but without actual decrease in area.

(3) Diminution in size or absorption may take place rapidly, in from 12 to 24 hours, or in even less time when the animal is given sharp exercise after a forced period of rest. In an animal kept at rest the œdematous type of plaque persisted, with more or less fluctuation and variation in form, for several, sometimes for 8 to 10 and on one occasion for 15 days. During this period the plaque may present a depressed centre owing to partial absorption of that part of the swelling, and, similarly, when only certain portions of a plaque are reduced at one time, it assumes a semi-circular, crescentic or other irregular shape. The skin over the region of a plaque that has persisted for several days and has then been completely reduced may remain slightly hardened, not elevated, for a number of days longer.

The fluids of 26 plaques (on animals 29 and 41) were examined for trypanosomata and the parasites were found in the fluids of 18 of them. Usually they were scanty in numbers, rarely, they were seen to be very numerous—3 to 5 trypanosomes to each field of the microscope. The most favourable time during the evolution of a plaque



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for the observation of the parasite proved to be just before the maximum swelling was reached and when the fluid had become clear or showed only a faint tinge of blood. However, it is impossible to find them present day after day, in fluid drawn from the same plaque. In a plaque that persisted for 9 days the parasites were found upon the 1st, 4th, 5th, 6th and 7th day of observation, and in one of 7 days' duration, on the 1st, 4th and 5th day. Not uncommonly they were found in the fluid of a plaque from the 2nd to the 3rd day of eruption.

Plaques, as a rule, have already existed several hours when first observed; they should therefore be punctured and the fluid examined as early as possible, and, if the result is negative, the operation repeated at intervals of two to three hours until a positive result is obtained, or until the plaque disappears.

While plaque eruption indicates a generalized infection, general symptoms, at this stage, may be surprisingly few, ill-defined or absent. In animal No. 41, the temperature curve was slightly but more or less persistently raised, varying between 100 and 102 degrees Fahrenheit. For the period of four months prior to the first appearance of plaque eruption there had been an absence of clinical symptoms, local or general. On the 24th day of the eruption, simultaneously with the presentation of the 8th plaque there occurred a severe exacerbation of genital symptoms, rapid unilateral swelling of the vulva and a pronouncedly œdematous mucous membrane; also, lesions of the eyeball and eyelid affecting one eye. The plaque eruption covered a period of 94 days, during which, from the 24th to the 34th day the foregoing symptoms were present; they then gradually subsided and at length, before the eruption of the 29th and last plaque, gradually disappeared.

Very similar observations were made upon animal No. 29; in this case the eye lesions were more severe and persisted longer, appearing simultaneously with the first plaque and existing until the 21st day of the full period of eruption. Lesions of the genital organs were absent.

There was slight muscular weakness; inco-ordination was not apparent and in neither case has the 'third stage' of the disease (emaciation, paraplegic symptoms, &c.) supervened or followed as a result of the generalized infection. On the contrary, the disease has again assumed a latent or dormant form and the animals a normal aspect. At the present time—the 26th month of infection—six months after the termination of the cutaneous symptoms, the general health and condition is very fair, and clinical symptoms are entirely absent.

In another case, however, in a naturally infected mare (No. 42, Table I), after a long period of latency seven plaques suddenly appeared, the disease then running a very acute course. Paralysis, at first of the eye, ear and right side of the head, soon became general and caused death in a few days or 20 days from date of eruption of the first plaque.

In six of the animals (Nos. 70, 3f, 9, 33, 35 and 82) there occurred subcutaneous œdema of the most dependent parts of the abdomen; these animals did not exhibit plaques. In three of the six cases the œdematous swelling was absorbed and did not recur, in the other three it was marked by alternating paroxysms and intermissions.

Briefly, in conclusion, the cutaneous symptom of dourine—the plaque or plaques—is by no means of frequent occurrence, but when present is reliable evidence of the presence of the disease in Alberta.

Probably 50 per cent of infected equines never exhibit this symptom; among those that do the eruption may be limited to a lone plaque, or, single plaques occurring very rarely—at long intervals of time, many months to a year or more—and, thus, very easily escape detection.

In but a comparatively few cases can there be witnessed a typical eruption—a group or succession—of plaques.

The period of evolution of a plaque occupies seldom less than three days, usually from four to five, sometimes from eight to ten, and, rarely, up to fifteen days.



The period between the infecting coitus or inoculation and the appearance of the first plaque was found to vary from one month to 21 months; the majority of the plaques occurred subsequent to the 18th month of the disease.

Trypanosomata may be constantly found present in the fluid of a plaque, provided the preparations are obtained in the stage of augmentation; less constantly they may be found present in the later stages or changes.

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#### CEDEMATOUS CONDITIONS OTHER THAN PLAQUES.

Localized œdema is the sign above all others that should lead one to suspect a possible dourine infection. In the foregoing I have dealt fully with the plaques and briefly noted the presence of large œdematous swellings under the abdomen; the latter condition, in stallions, is usually associated with œdema of the genital organs, in mares it may occur quite independently of any other notable symptom, but in any case, its appearance is as uncertain as that of the plaques and then only in a comparatively late stage of the disease.

Excepting in very advanced cases coming under late observation and marked by emaciation and paralysis, I have yet to see a case of dourine in the horse, that, if kept under close and prolonged watch, has not exhibited at one time or another, or periodically, local œdema, by which I refer in particular to œdema of the external genitals.

Directly after the incubation interval and for the next few months more than at any other time, is a mare most likely to infect a covering stallion, for it is at such time that the parasites are present in greatest numbers in the vagina; later on, they may reappear there on rare occasions or may never again give an indication of their presence. Obviously, then, it is of the greatest importance to be able to detect an infection in the early stages, but in order to do so one has to depend wholly on (1) *genital symptoms* and (2) *body temperature*.

(1) There is *only one genital symptom that has a value in diagnosis, and that is, œdema*. Leucodermic patches on the external genitals, perinæum and anus, and depigmentation of the clitoris, are frequently associated with this symptom and occur as a sequel to or result of trypanosome development, œdema and phagocytosis in the tissues of the parts affected. They may occur, however, from other causes that are in no way connected with dourine, for one knows that the normal colouration in healthy horses varies considerably and that anomalies of pigmentation are quite common. The depigmentation in dourine begins in small patches, it gradually spreads and is frequently transitory; during lengthy intermissions in the course of infection the parts may totally regain their colouring matter.

Whitish spots on the margins or just inside of the vulva are to be found in both dourined and non-dourined mares. These spots or small patches have a finely granular surface which is readily inclined to peel off. Deep down in these lesions, or after a scrubbing and thorough washing, there are to be found masses and coils of a slender, spirochaetae-like organism, small numbers of which can often be found in the vaginal



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secretion of healthy mares. This organism, probably, becomes slightly pathogenic to tissues weakened by dourine or from various other causes; it multiplies, not only in these whitened spots (which are not to be confused with depigmentation proper, where there is no loss or shedding of the cellular elements), but also in ulcers when these are found present and is probably the direct cause of either lesion.

In not one of the animals experimentally infected with dourine have I ever seen a vesicle, an ulcer or a cicatrix, lesions which are apt, mistakenly, I believe, to be attributed to dourine. Such lesions I have rarely seen in a few cases of natural infection, but regard them as independent of the disease under study.

Vaginal discharge is another unreliable sign, and, more frequently than not, is an absent one in straight dourine.

But an intermittent or remittent tumefaction of the vulva, of the sheath in stallions, the anus, plaque-like swellings extending from the genitals down the inside of the thighs, and an œdematous, swollen appearance of the vaginal or urethral mucous membrane are signs of probable infection.

The earlier the stage in the disease, in mares, the more clearly defined are the exacerbations of œdema; this is the rule when the incubation interval has been a short one, but when prolonged there are exceptions to it. In stallions, the first tumefactions of the sheath may be very slight, the paroxysms and intermissions becoming better marked as the disease advances.

In mares, again, the recurrences of œdematous swellings vary from their original location, thus, first one side of the vulva, then the other, only the lowest portion at the inferior commissure, then the anus, the inner side of one thigh or buttock, presents, each in turn and after intervals of time of from one to four weeks, a well marked œdematous swelling, in any one of which, if examined in time, trypanosomata may be found. At first, the duration of each of these swellings is, usually, from 4 to 6 days, later on, they become more chromatic and fluctuating, less well defined; the period of remission or intermission lengthens out and the skin or tissues of the areas involved may remain thickened but flabby and with loosely hanging folds on either side of the vulva.

It is of interest to note that in a horse colt and several fillies there have been recurrences of anal œdema (trypanosomes present) long after tumefactions of the genitals had ceased. The anal œdema was associated with great irritation of the part, increased secretion, depigmentation, diarrhoea, and the passage of dysenteric stools.

<sup>1</sup> Recent literature contains a number of observations of lesions in the intestines, in trypanosome diseases, particularly of hæmorrhagic conditions. It may well be that in dourine, when the trypanosomes disappear from the genitalia and do not return they work their way into the intestinal walls, and that the passage of blood and mucous, and œdema of the anus, especially when no changes are apparent in the sexual organs, is a valuable sign of dourine infection.

#### *Ocular Lesions.*

These are valuable indications. We might place the time or period of their occurrence in an intermediary stage, between the primary or genital symptoms on the one side, plaques and lesions of the central nervous system on the other. As a rule, only one eye is affected; the first notable alteration is, usually, a drooping upper eyelid; this sign may be associated with or followed by photophobia, lachrymation, swollen lids, and, still later, by a bulging of the eyeball. I have seen such lesions come and go within a period of ten days, but usually they are very persistent. More rarely, a corneal opacity may develop, independently of the foregoing.

<sup>1</sup>Thiroux, Kérandel, Natton-Laurier. Bulletin de la Société de pathologie Exotique. Tome II, No. 6, pp 314-317. June, 1909.



*Sexual power and procreation.*

Mares may exhibit increased sexual desire; when it occurs, it is very plainly marked—a state of nymphomania—but in many mares it is not in the least apparent. Stallions are capable of connection up to late in the disease, although there may be a periodical loss of power. It is not unusual for infected mares to bear offspring.

Recovered mares can also be bred successfully, though a percentage remain sterile, some of the latter apparently losing all sexual instinct. (See table of breeding experiments, No. II, appended at end of report, and remarks on results of breeding experiments.)

*Examination of Body Fluids for the Dourine Parasite.*

*The surest method of diagnosis* is that which enables one to detect the parasite,—*T. equiperdum*. The finding of this parasite in infected animals is not quite such a difficult matter as generally claimed. The trouble is that it is considered too closely as a blood parasite, and too much blood examined. The examination of less blood and more œdematous fluids will give many more positive results.

*Gland Palpitation and Puncture.*

The method of gland puncture for demonstrating trypanosomes has proved very disappointing. Undoubtedly, in dourine, the superficial glands become very much enlarged, the submaxillary even more prominent and palpable than the inguinal or pectoral. However, one knows that healthy horses are extremely liable to glandular enlargement from very trivial or no apparent causes, so that, in suspected dourine, the sign has to be interpreted very cautiously.

Even when trypanosomes have been found in great numbers in the plaques and genital œdematous swellings, the method of gland puncture has failed to reveal them.

*The relative value of postmortem findings.*

In the late stages of disease a diagnosis can generally be arrived at on the well-known clinical symptoms:—loss of co-ordination, paralysis, &c.; when these characteristic symptoms are not presented, and the case is marked simply by a chronic progressive emaciation and enfeeblement, postmortem findings will be found of little value. One would naturally expect to find yellowish discolorations of the connective tissues, serous transudations and fibrinous deposits or growths in the large body cavities, a petechial spleen, damaged excretory organs, and marked changes in the blood-forming marrow—and one does find them, but, personally, I am unable to find in them anything that serves to differentiate the disease from other chronic wasting diseases. When signs of dourine are absent at an examination during life I greatly doubt the possibility of confirming the suspicions one may have held, by postmortem findings.

*Note on serum-diagnosis.* I can only say at present that while several very decided reactions were obtained from the injection of certain sera into animals affected with a latent or mild form of dourine, in other animals similarly affected, to all appearances, the reactions varied greatly or were nil.

A series of experiments was undertaken with dourine sera and rabbits, in order to ascertain the praecipitating properties of the sera, and if a praecipitin-test could be made available. The experiments were progressing nicely and a rabbit serum was obtained that praecipitated dourine serum markedly, but had little or no effect on normal horse serum, when—in the June flood of 1908—both rabbits and my whole storage of sera were swept away. Lack of time has prevented me from repeating these experiments.



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## EXPERIMENTAL TREATMENT OF DOURINE IN HORSES.

Atoxyl—an organic compound of arsenic—was introduced in 1905 by Dr. Wolferstan Thomas,<sup>1</sup> of the Liverpool School of Tropical Medicine, as a curative agent in cases of Trypanosomiasis, in which, in the hands of various workers, it subsequently proved of great value.<sup>2</sup> Its success at first seemed so great that it was considered deserving of a trial in the treatment of the trypanosome disease of horses,—*Dourine*, then under investigation at the Experimental Station, Lethbridge, Alberta. The following experiments were undertaken in 1908:—

## I.—TREATMENT BY ATOXYL.

*Experiment 1.*—A Clydesdale stallion (animal No. 35), about 1,800 lbs. (800 kilos) in body weight, in the final stages of naturally acquired dourine—probably the 19th to 20th month of the disease. The supply of atoxyl arrived too late to expect good results from its administration to this animal but trial doses were given with the object of viewing the effect they might have, however transient, at this stage of infection, the hopelessness of which was indicated by great muscular weakness and emaciation; enormous swellings, partly œdematous and partly organized, of the genitals and lower surfaces of the abdomen and chest; lesions of the eyes, articulations, &c.

*Atoxyl injections, (20 per cent solution):—*

Feb. 18, 1908, intravenous. . . . .	1.0 gramme.
Feb. 20, 1908, intravenous. . . . .	1.0 gramme.
Feb. 20, 1908, subcutaneous. . . . .	1.0 gramme.
Feb. 23, 1908, intravenous . . . . .	2.0 grammes.
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	5.0 gramme.

The drug was given in a warm, freshly made 20 per cent solution in sterile normal saline as recommended by Breinl and Todd, for the treatment of sleeping sickness.

On the evening of February 20, 5 to 6 hours after the injection of the 2nd and 3rd doses of 1.0 gramme each, the animal became very restless and distressed—in marked contrast to its usual depressed wearied behaviour. At times there appeared to be colicky pains. The dose of atoxyl for such a large animal seemed proportionately small but the symptoms were very suggestive.

The following day the weakness was very great and the dullness amounted to almost lethargy. The condition improved somewhat on the next day, weakness was not so marked, volition had returned. On February 23, the 4th dose was given, 2-gms.; 6 to 7 hours later there was a recurrence of toxic symptoms; the extremities became cold, there was severe abdominal pain and death occurred 27 hours after the injection.

At the autopsy, in addition to the usual changes associated with chronic dourine, crimson hæmorrhagic patches were found profusely scattered over the coverings of the abdominal viscera.

So far was the disease advanced that, had the atoxyl not been given, the animal could scarcely have lived more than a few weeks.

*Experiment 2.*—A filly (animal No. 70) aged 2½ years, about 675 lbs. (300 kilos) in body weight.

Oct. 4, 1907—inoculated with *Trypanosoma equiperdum*. Incubation period, 14 days.

Feb. 1, 1908—trypanosomes still present in œdematous fluids of vaginal mucous membrane. An œdematous swelling upon the lower surface of the abdomen. Body is undernourished and there is a general appearance of weakness and ill-health.



*Atoxyl injections (15 per cent solution):—*

March 5, 1908, subcutaneous.. . . .	0.75 grammes.
March 8, 1908, subcutaneous.. . . .	1.50 grammes.
March 12, 1908, subcutaneous.. . . .	2.00 grammes.
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	4.25 grammes.

Shortly after this brief treatment symptoms rapidly disappeared and recovery became apparent. There has not been any sign of recurrence to date, more than a year after the injections of atoxyl. Trypanosomes have never again been found present in the blood or body fluids. From April to November, 1908, the submaxillary glands were much enlarged; they were punctured at intervals and the juice examined but the parasites could never be observed.

The withdrawal of a large quantity of blood (an operation which is apt to give a fresh impetus to a latent infection of dourine). 5000 c.cm., on September 10, 1908, was without after effect in bringing on any symptoms or signs of a recurrence.

*Experiment 3.*—A gelding (animal No. 74) aged 4 years, about 1,125 lbs. (500 kilos.) in body weight. The duration of the disease and how it was acquired is not known. The animal was raised in a herd in which dourine was very prevalent (the stallion and a number of mares belonging to this herd had died of dourine and others found affected were destroyed) and exhibited the paralytic symptoms so generally and closely associated with dourine. Trypanosomes could not be observed. There was auto-agglutination of the red blood cells and the differential leucocytic count showed a lymphocytosis of 80.4 per cent.

The condition for over six months prior to the commencement of treatment was as follows:—Dragging of the hind quarters, knuckling of the fetlock joints, the points of the hind hoofs worn down; tenderness over the loins, loss of balance, the limbs apparently unable to afford a mechanical support to the body; a swaying, unsteady, tripping gait. There was a paralysis of the tail.

The condition was almost identical with that of a dourine infected mare which had frequently shown trypanosomes in her blood.

*Atoxyl injections (15 per cent solution):—*

April 7, 1908, intramuscular.. . . .	0.75 grammes.
" 9, " " " " " " " " " " " "	1.00 "
" 12, " " " " " " " " " " " "	1.00 "
" 14, " " " " " " " " " " " "	1.25 "
" 18, " " " " " " " " " " " "	1.50 "
" 24, " " " " " " " " " " " "	2.00 "
May 5, " " " " " " " " " " " "	2.50 "
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	10.00

On cessation of treatment the body was better supported, the gait had slightly improved, the tail was held in a normal position and capable of voluntary movements.

On May 9 there appeared an œdematous swelling at the most dependant part of the abdomen; this was absorbed within three days.

During June the improvement was maintained and rather increased. In August there was a recurrence, the symptoms became more marked than ever, and the general condition worse. This was again followed by a slight improvement; for the past six months there has scarcely been any change and the condition now differs but little from that which obtained before treatment, one year ago.

II. TREATMENT BY ATOXYL AND MERCURY.

*Experiment 4.*—A mare (animal No. 76) about 12 years of age and 1,215 lbs. (540 kilos.) in weight, in all probability infected by the stallion mentioned in experi-



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ment 1, by whom she was covered in August, 1906. The mare did not come under observation until a year later and then showed suspicious signs of dourine.

In December, 1907, definite symptoms were presented. There were various facial paralyses—ear, eye, nostril, under lip and throat. The gait was uncertain. The submaxillary lymphatics were enlarged and the udder was much swollen (the mare had had no offspring for four years and was not then with foal). The body was undernourished, but not emaciated. There was no remission of symptoms until after the treatment given which was commenced in what was probably the 19th month of the disease. Trypanosomes could not be found.

*Atoxyl injections (15 per cent solution):—*

March 5, 1908, intravenous..	0.75 grammes.
" 9, " " ..	0.75 "
" 9, " subcutaneous..	0.90 "
" 12, " " ..	1.80 "
" 17, " " ..	1.80 "
" 21, " " ..	2.00 "

After this first course of atoxyl treatment the muscles of the affected ear and eye showed a partial recovery. There were then given:—

*Mercury bichloride injections (0.5 per cent solution):—*

March 28, 1908, intravenous..	0.25 grammes (50 c.cm.)
April 1, " intramuscular ..	0.25 " " "
(in 4 injections.)	

Very painful swellings resulted from the bichloride injections and there was administered as follows:—

*Potassium Iodide—(by the mouth.)*

April 3, 1908, drench..	6.0 grammes.
" 4, 1908, " ..	6.0 " "
" 5, 1908, " ..	6.0 "

The swellings were soon absorbed and there were resumed—

*Atoxyl injections (15 per cent solution):—*

April, 7, 1908, intravenous..	0.75 grammes.
" 9, 1908, " ..	0.90 "
" 14, 1908, " ..	1.25 "
" 19, 1908, " ..	1.50 "
" 25, 1908, " ..	1.75 "
May 3, 1908, " ..	1.85 "
" 12, 1908, " ..	2.00 "
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	10.00 "

Thus, during 10 weeks treatment, the mare received 18.0 grammes of atoxyl (in two courses), 0.5 grammes of mercury bichloride and 18.0 grammes of potassium iodide (in the interval between).

During May and June a steady all-round improvement was maintained, the paralyses gradually disappearing until a normal muscular control was regained.

It is now a year since the cessation of treatment and recovery is, at least, apparent.

In experiment 3, I have mentioned the case of a mare showing dourine paralyses or muscular inco-ordination similar to those described in the gelding, and which had furnished absolute proof of the infection by the presence of the trypanosomes. This mare was naturally infected in the same month and year, August, 1906, and by



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the same stallion as mentioned above in this experiment. She has not been given any treatment and may therefore be considered as a control animal. The results show that the treated mare is apparently cured while the control is in a wretched and hopeless condition and not likely to survive another six months. Nearly three years have elapsed since infection in either animal.

### III.—TREATMENT BY ATOXYL AND DONOVAN'S SOLUTION.

*Experiment 5.*—A horse-foal (animal No. 3f.). Inoculated on August 16, 1908, when 7 weeks old. Trypanosomes appeared upon the 30th day following. Treatment was commenced upon the 112th day. During this interval there occurred paroxysmal fever and swelling of the genitals (sheath). The animal was between 5 and 6 months of age and about 225 lbs. in weight (100 kilos) when a *first course of treatment* was given as follows:—

#### *Atoxyl injections (15 per cent solution):—*

December 5, 1908, intravenous.. . . .	0.6 grammes.
“ 8, 1908, “ .. . . .	0.9 “
“ 12, 1908, subcutaneous.. . . .	1.2 “
“ 18, 1908, intravenous .. . . .	0.8 “
“ 22, 1908, “ .. . . .	1.2 “
“ 26, 1908, “ .. . . .	1.2 “
	—
	5.9 “

The intermittent type of fever in this animal has been remarkable throughout the infection on account of the regularity and the likeness of the alternating paroxysms and intermissions. I do not know of any other case of dourine on record in which such a series of exacerbations of temperature have been shown.

Treatment was commenced upon the last day of a febrile paroxysm, probably the 5th in succession, of 6 days duration and which was preceded by an intermission of 16 days. It is noteworthy that the following intermission and paroxysm—during and in spite of treatment—is exactly the same in the number of days, 16 and 6, respectively. The next in succession—in the absence of treatment—occupied 29 and 5 days, respectively.

#### *Second course of treatment:—*

		Atoxyl.	Donovan's Solution.
Jan.	28, 1909, intravenous.. . . .	1.00 gm.	.....
“	31, 1909, “ .. . . .	.....	10.00 c. cm.
Feb.	6, 1909, “ .. . . .	.....	10.00 “ “
“	15, 1909, “ .. . . .	1.40 “	.....
“	17, 1909, intramuscular.. . . .	.....	10.00 “ “
“	21, 1909, intravenous.. . . .	1.50 “	.....
“	25, 1909, intramuscular.. . . .	1.00 “	.....
“	26, 1909, “ .. . . .	.....	10.00 “ “
“	28, 1909, “ .. . . .	0.80 “	.....
Mar.	3, 1909, “ .. . . .	.....	10.00 “ “
“	5, 1909, “ .. . . .	0.75 “	.....
“	8, 1909, “ .. . . .	.....	8.00 “ “
“	13, 1909, “ .. . . .	0.75 “	.....
		—	—
		7.20 “	58.00 “ “



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The intermissions from, and paroxysms of fever during this second course of treatment were 13 and 6 days, 25 and 5 days, respectively.

The temperature, in each of the five paroxysms commencing with the one where atoxyl was first given, reached 105 degrees Fahrenheit, or over.

After a number of intravenous injections had been given painful swellings arose along the jugular furrows and intramuscular injections had to be substituted; these also were apt to cause some local irritation.

Eye symptoms were first observed during the interval between the two courses of treatment, since when they have never been absent.

The right eyeball protrudes more than its fellow, the lids are thickened and semi-paralyzed; there is dimness and, at times, weeping and a marked sensitiveness to light. Since treatment there has not been any recurrence of tumefaction of the genital organs, neither have cutaneous symptoms been presented. On cessation of treatment cerebro-spinal disturbance was plainly to be seen, and this is steadily increasing in intensity. Trypanosomes have been searched for during the febrile periods, but could not be observed.

As control-animals a filly-foal, a few months of age, and a 3-year-old filly were inoculated from the same source. In these animals, although there have been frequent recurrences of trypanosomes in the fluids of the swollen lamia pudendi and vaginal mucous membrane, the disease has made less progress than in the treated stud-colt. This is hardly surprising when it is remembered that in the stallion dourine seems to be invariably fatal, while mares may tolerate the infection for long and unknown periods, apparent recoveries not uncommon. However, in two fillies inoculated after further passages of the trypanosome through equines, the infection is very severe and similar to that which has occurred in the above animal.

## SUMMARY OF RESULTS.

Experiment 1.—Atoxyl, in small doses, could not be tolerated by a stallion in the final stages of dourine. The drug produced toxic symptoms and was probably the immediate cause of death.

Experiment 2.—Atoxyl treatment in a filly in the 6th month of the disease was rapidly followed by disappearance of symptoms and apparent recovery.

Experiment 3.—Atoxyl treatment in a gelding showing paralytic symptoms of dourine resulted in a temporary improvement; recurrence followed in the 3rd month after cessation of treatment.

Experiment 4.—Atoxyl and mercury bichloride treatment, commenced in the 19th month of the disease in a mare showing paralytic symptoms of dourine, was followed by disappearance of symptoms and apparent recovery.

Experiment 5.—Atoxyl treatment, commenced in the 4th month, followed, after an interruption and in the 6th month, by atoxyl and Donovan's solution, entirely failed to arrest the steady progress of the disease in a young stud-colt (under one year of age).

Controls.—A mare, in control to experiment 4, appears to be dying of dourine. Two filly-foals—experiment 5—show marked but less severe symptoms. In two fillies inoculated later the disease is running a course almost parallel to that of the treated stud-colt. Trypanosomes are frequently to be found in all four fillies.

Recoveries.—Years must elapse before one can pronounce an absolute recovery from dourine. Wherever an expression of recovery or cure is used in this paper *apparent* is to be understood unless otherwise indicated.



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*General remarks on experimental treatment and our present means of testing a cure or recovery.*

The observations in experiment 1 furnish additional evidence to what has recently been made known of the danger of administering atoxyl in an advanced stage of a trypanosome disease, where there is a probability of nephritis or degenerative changes in the kidneys and excretory organs.

In experiments 1 to 4, the doses given of atoxyl were proportionately small—commencing with 1. gm. or less and never exceeding 2.5 gms. In experiment 5 the doses of atoxyl were proportionately large, for, although 1.5 gm. was not exceeded as a single dose, such an amount for this animal, weighing from 100 to 125 kilos., would be equivalent to 6 gms. and over for a horse weighing 500 kilos.

Uhlenhuth, Hubener and Woithe<sup>4</sup>, in treating animals infected with a very virulent strain of dourine, were able to check or weaken the disease in a horse by giving 5 gm. doses of atoxyl; the blood, however, remained infective for mice. The horse lived but 12 months, while the untreated, control horse died after four months. Larger doses than 5 gms. could not be given.

According to these authors,<sup>5</sup> 'As early as possible, as much as possible—is the fundamental law which holds unconditionally for the chemo-therapeutic treatment of the trypanosome diseases.'

In experiment 5, the above maxim was fairly well followed, but, nevertheless, the treatment did not appear to be of the slightest avail. In experiment 2, only three doses of atoxyl appeared to have the remarkable effect of aborting the disease. Was the retreat or recovery in this case a spontaneous one coincident with the injections of atoxyl, or did it directly originate in the trypanocide action of the drug?

It is possible there is a brief period, a particular phase of development in each of the trypanosome life cycles that are evolved in the course of dourine in the horse, especially in the early stages of infection, in which the parasite is particularly susceptible to atoxyl, and that if, perchance, the drug, is given for the *first time* during one of these ripe, physiological moments and before resistance has been acquired from its administration, say, during an interval of trypanosome inactivity, the destruction of the parasites is complete, not even the hypothetical 2 per cent surviving to restart the disease.

Moore, Nierenstein and Todd,<sup>6</sup> thinking there might be a resistant stage of the parasite which survived the first treatment by atoxyl, searched for a drug that might 'act upon the latent form of the trypanosome which must in all probability exist in blood or tissues while the active form is being held in abeyance by atoxyl or other drugs.' These observers found that mercury perchloride had a decided value in the treatment of Nagana-infected rats when its administration followed that of atoxyl (given alone mercury has little effect as a trypanocide), and suggested that the combined method be given a trial in natural trypanosome infections of man and animals. Later on, trying their method on Nagana-infected donkeys they failed to save them.

Only one year having elapsed since treatment in experiments 2 and 4, it is too early to speak with any certainty of the cure or recovery by atoxyl alone, in the one case, and by the combined method of atoxyl and mercury, in the other. (See foot note.)

The short series of experiments here given was only intended as a preliminary step, and was carried out with the hope that the results might furnish some indication and justification for a further line of work upon a larger scale.

It may serve to avoid errors in conclusions to mention again that the strains of dourine that I have been able to observe in Alberta, and to maintain by experimental inoculation in horses, are much less virulent than those generally described in experiments conducted in European laboratories or of the Algerian and Indian varieties. Time and again the inoculation of dourine fluids, sometimes rich in trypanosomes, into dogs, rabbits, rats and mice has failed to produce an infection that could be



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observed either by clinical symptoms or the presence of the parasites. It was considered useless, therefore, to carry out a number of sub-inoculations in connection with above experiments save in equines, and sufficient of these was not available. A few sub-inoculations were made in rats, in an experiment to ascertain if what appeared to be an 'atoxyl resistant strain' could infect these animals. The results were likewise negative.

It was considered advisable before trying a big series of experiments on the therapeutica of dourine to wait until the later results of experimental infections in untreated equines were obtainable, and until a strain exalted in virulence and lethal for laboratory animals could be employed. Only then would one be able to eliminate the very likely possibility of spontaneous recoveries and for sub-inoculations as a test of recoveries or of cures to have a definite value.

In experiment 2 I have mentioned blood-letting as apt to bring about a recurrence of the disease. Lingard<sup>7</sup> observed that in certain latent cases of dourine the loss of blood brought on an eruption of cutaneous plaques, and suggested that bleeding might be had recourse to as an aid in diagnosis. Bloodletting, when carried very far, I have repeatedly observed was followed by dourine symptoms, sometimes by severe exacerbations. In several instances, examination of the body-fluids (blood, mucous, œdema) at intervals after bloodletting enabled me to note the presence of trypanosomes in an animal in which all previous examinations had failed to reveal them.

Our present means of testing the cure of a trypanosome infection in man or animal are very limited and slender; animal inoculation and auto-agglutination of the red blood cells. In the former positive results only are of much value, as failure to infect may be due to one or more of a variety of causes, as, *e.g.*, the periodicity of trypanosomes in the blood and their likely absence from it at the time of the test inoculations or for long intervals during and following an apparently successful course of treatment.

The phenomenon of auto-agglutination of the red cells in trypanosome-containing blood has for long been known though but recently considered in the light of a test; its constancy in latent or tolerated infections may be doubted until more confirmation is forthcoming. It is unnecessary to enlarge upon the difficulty and importance in coming to a decision as to the reality of a cure or recovery, but it is here suggested that the simple means of bloodletting can be employed as an additional test and will be found of value in bringing on a recurrence of trypanosomes in the blood of animals which have made an apparent but not an actual recovery and in increasing the number of positive results from test inoculations made at intervals after bloodletting.

In Canada the evolution of dourine is very dilatory. Long periods of interruption occur in which the disease lies quiescent and unrecognized and in which the animal may maintain health and condition. It is known that these stages of tolerance may give way to a relapse but in some horses they appear to exist indefinitely. It is probable that in a large number of cases, in mares, the disease does actually die out; at all events certain of these animals condemned for dourine in 1904 and since held in quarantine are still alive and in excellent health and have not exhibited any recurrence during the 2½ years that they have been under my observation. Bloodletting has not induced symptoms; auto-agglutination of the red cells is not to be observed. Moreover, and as infected mares are usually credited with sterility or with aborting their young should they conceive, it may here be mentioned that 8 of

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NOTE.—In an abstract (Vety. Journal, p. 373, No. 409, Vol. 5) from a paper by Monad, 'Cure of a stallion suffering from dourine by means of atoxyl,' it would appear that a lapse of 170 days without any return of the illness was considered sufficient to indicate that a cure had taken place. Such an interval would be altogether too short in arriving at a similar conclusion in a case of Canadian dourine, in which recurrence may follow a six months' period of health.



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these tolerant or recovered mares were bred to a healthy stallion in 1906, 4 becoming pregnant and foaling after normal term. In 1907, 13 mares, including the above 8, were bred to the same stallion (which had received a local disinfection after each service and remained healthy), 8 foals resulting. Again, in 1908, 14 mares, including the foregoing, were bred with the result of 9 foals. One mare died after a prolonged illness and emaciation, whether from dourine or not the symptoms did not clearly indicate. In one or two there has rarely been noted a slight transient suspicion of symptoms. In none has it been possible to detect the *T. equiperdum* and the majority are maintaining their healthy condition.

It is reasonable to believe in the possibility and the frequency of natural recoveries from dourine in Alberta; and that, assisted by a suitable treatment, a still greater number would recover and in less time.

Atoxyl, though a valuable trypanocide, is not the specific drug for trypanosomiasis as was at first indicated. Its employment alone is no longer recommended but it is advised in combination or alternation with other trypanocides, a number of which are now known and being exploited. Valuable trypanocide agents are found among the arsenical compounds, organic and inorganic; antimonial compounds, certain dyes and benzidin derivatives. Some of these are claimed to be the equal of Atoxyl in their action in rapidly driving the trypanosomes from the circulation. It is noteworthy, however, that remedies or methods of treatment that have cured rats and mice of acute trypanosome infections have not succeeded nearly so well in the chronic infections of man and the domesticated animals. In the former, complete disinfection of the blood seems to be possible but whether it can be attained in the latter is still a problem to be solved. At present, the therapeutic dose of any of the well known trypanocides seems perilously near to the toxic.

The trypanosomiasis of man and animals are now receiving an exhaustive investigation at the hands of various governments and numerous laboratory workers throughout the world and there is reasonable hope and belief that their efforts will result in the discovery or invention of the means of successfully combatting them.

The bulk of the research work and experimental treatment of these diseases has been carried out with the purpose of finding a way to stop the ravages of Sleeping Sickness in man, the trypanosome scourge that continues to spread throughout Equatorial Africa, attacking both the black and the white races. Sleeping Sickness and dourine bear a marked similarity to one another in a number of respects—their great chronicity, the alternating periods of presence and absence of trypanosomes in the blood, their scantiness in numbers, difficulty of detection and diagnosis; the stages of apparent recovery, tolerance and relapse. Mott<sup>8 & 9</sup> found the histological changes in the nervous system in dourine analagous to those occurring in Sleeping Sickness. Uhlenhuth and Woihe<sup>5</sup> speak of the 'parallelism in these two diseases both in their nature and in the chemo-therapy.' Experiments on the one, therefore, have a decidedly practical significance in regard to experiments on the other, and, a specific remedy or method of treatment for the cure or prevention of the one will always merit a fair trial, with a probability of success, in the experimental treatment of the other.



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TABLE II.

Showing summary of breeding experiments, 1906-1909, with mares that (a) had apparently recovered from, (b) easily tolerated or seemed to be recovering from, and (c) were reinoculated, artificially, with a view to active immunization.

		1906-7.				1907-8.				1908-9.				Remarks.
Number of mares bred.		To healthy stallion (H).	To Dourine Stallion (D).	* Recurrence of symptoms.	Offspring.	To healthy stallion (H).	To Dourine stallion (D).	Recurrence of symptoms.	Offspring.	To healthy stallion (H).	To Dourine stallion (D).	Recurrence of symptoms.	Offspring.	
(a)	4..	Not bred.				H	.....	.....	1	H	.....	.....	1	Recovery maintained throughout.
(a)	5..	"				H	.....	.....	1	H	.....	.....	1	" " "
(a)	6..	H	.....	.....	1	H	.....	?	1	H	.....	died.	.....	Emaciation and diarrhoea; no clear indication of Dourine.
(c)	7..	H	.....	.....	.....	H	.....	.....	.....	H	.....	.....	.....	Apparently immune to repeated inoculations.
(a)	8..	H	.....	.....	1	H	.....	.....	1	H	.....	?	.....	Excellent health to March, 1909; recent failing, diarrhoea.
(a)	11..	H	.....	.....	.....	H	.....	.....	1	H	.....	.....	1	Recovery maintained throughout.
(a)	15..	H	.....	.....	1	H	.....	.....	1	H	.....	.....	1	" " "
(a)	18..	H	.....	.....	1	H	.....	.....	.....	Not bred.				" " "
(a)	19..	H	.....	.....	.....	H	.....	.....	1	H	.....	.....	1	" " "
(a)	20..	H	.....	.....	.....	H	.....	.....	.....	H	.....	.....	.....	" " "
(b)	24..	.....	D	?	1	H	.....	?	.....	H	.....	.....	1	" " 1907-9.
(b)	13..	.....	D	?	.....	H	.....	?	1	H	.....	.....	1	" " throughout.
(b)	14..	.....	D	?	.....	H	.....	?	.....	H	.....	.....	1	Recovery maintained though very slight local changes (?) noted.
(c)	17..	.....	D	.....	.....	Not bred.				H	.....	.....	1	Apparently immune to repeated inoculations.
(b)	2..	.....	D	?	.....	.....	D	?	.....	H	.....	.....	1	Slightest local changes, 1906-7; excellent condition, 1908-9.
(b)	3..	.....	D	?	.....	.....	D	?	.....	Not bred.				Similar to preceding.
(b)	10..	.....	D	?	.....	.....	D	.....	.....	.....	.....	.....	.....	Excellent condition throughout.
(c)	9..	.....	D	s	.....	.....	D	s	.....	.....	.....	.....	.....	Successfully reinfected in 1907. Apparent recovery, 1908-9.
		8	8		4	13	4		8	14			9	
					1									

"?"—Slight local changes of the genitals, none of which could be clearly referred to Dourine.

"s"—Recurrence of symptoms of Dourine.

For details of experiments with mares (c) Nos. 7, 9 and 17, see pp. 69

REMARKS ON THE RESULTS OF THE BREEDING EXPERIMENTS.

In another connection ('Experimental treatment, and present means of testing a cure or natural recovery). I have briefly mentioned the results of these breeding experiments. I have also considered under 'Immunity' the active immunization of mares 7, 17 and 9 by experimental inoculation. It will now be seen that mare No. 17, in 1906, and mare No. 9, in 1906 and 1907, were further exposed to a natural reinfection by being covered by a dourined stallion. But neither in these mares nor in the six others covered by a dourined stallion, was there a typical local action; indeed, the changes that occurred were very slight and of doubtful origin and the results of that series of experiments indicate, I think, that the mares enjoyed a strong local immunity.



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It is interesting to note that the 1906-07 foal of mare No. 24 was sired by a dourined stud and that the foal, now a two-year-old, is strong and healthy. Mare No. 13, bred to a dourined stallion in 1906, was barren; to a healthy stallion in 1907, and again in 1908, has twice brought forth young and maintains recovery. The case of No. 2, bred for two consecutive years to dourined stallions and, in the third year, to a healthy stallion with the result of foaling, is a still stronger indication of a naturally acquired immunity.

The breeding of the recovered mares to a healthy stallion demonstrates their capability of bearing offspring in a very fair percentage of cases. All mares in this class maintained their excellent condition throughout the experiments, save two, which, in the third year, failed, exhibiting emaciation and diarrhoea, the issue proving fatal in the one case and now apparently leading towards a similar ending in the other. The healthy stallion, locally disinfected after each service, has escaped infection during the three years' experiments.

It would be interesting to ascertain whether these mares, apparently recovered or immune, are actually so, or are still carriers of the trypanosome and capable of infecting, through coition, a healthy stallion.

The dourined stallions used in above experiments died of the disease.

## CONCLUDING REMARKS.

As a result of almost innumerable examinations of the fluids for the detection of trypanosomata in the genital organs, carried on for the greater part of three years in both naturally and experimentally infected equines, I can safely conclude that it is in the early stages of infection that the parasite are most active and numerous in the genital organs, and that as the disease advances or as an animal becomes tolerant or indifferent to it, the parasites disappear from these regions and very rarely return to it, perhaps in many cases, never.

Furthermore, when the parasite is transmitted, experimentally, from horse to horse during the early paroxysms of an infection, with each successive passage the incubation interval may be shortened and the virulence of the infection increased, but when transmitted during a late stage or during a marked period of tolerance, the incubation interval is prolonged and the issue, usually, an easily tolerated infection.

The possible duration of a trypanosome infection in man and animals without the betrayal of any definite sign of its presence is, without doubt, an exceedingly long one. It is not improbable, however, that in this country, at least, among equines there are being naturally propagated weak and attenuated strains of dourine as well as virulent ones, and that, through the former, which likely escape detection, the natural acquirement of immunity is being slowly brought about, and a native resistant race of horses established, but which is in part offset by the constant importation of fresh and susceptible breeding stock.

Our knowledge of the parasite of dourine, of immunity and recovery is still very incomplete and until more facts can be referred to and criterions of cure or recovery made known, it will be safest, to the horse breeding industry in general, to consider an animal that survives infection as a possible carrier of it.

In the meantime, and in the light of our present knowledge of the dourine of Canada and its mildness in comparison with tropical varieties, it is a disease that lends itself favourably to further research and experiment with a view to successful treatment and prevention.



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## APPENDIX No. 11.

OTTAWA, May 1, 1909.

SIR,—I have the honour to transmit the accompanying bulletin on Rabies by Dr. George Hilton, Chief Veterinary Inspector, and to recommend that it be printed for distribution.

Although occasional cases of rabies have from time to time been reported, it is only within very recent years that any actual authentic outbreaks have occurred in Canada.

Rumours of its existence in that portion of the province of Saskatchewan lying along the International boundary obtained currency in 1905 and 1906, but in every instance investigation failed to discover any good ground for these reports.

In the last two years, however, a number of outbreaks have been dealt with in Ontario and the disease has also been detected in Manitoba, Saskatchewan and Alberta. I am glad to say that the prompt and thorough manner in which the regulations of this Branch have been enforced has, in every instance, prevented the spread of the disease, and that, so far as can be ascertained, no loss of human life has resulted and very few animals, other than dogs, have become infected.

The knowledge of the general public as to the true nature of rabies and its manifestations is so defective and so much clouded by tradition and nervous dread, that any dog acting in a peculiar manner is very apt to become an object of suspicion and to be hunted down and killed as mad. Under ordinary circumstances, the death of the animal in this way destroys all possibility of confirming the facts as to the existence or non-existence of the disease.

This lack of definite evidence constitutes one of the greatest difficulties encountered in dealing officially with reported outbreaks, and it is with the view of enlightening the public as to what rabies really is and how to deal with suspected animals, that this bulletin has been prepared for general circulation.

It is to be hoped that its distribution in Canada will assist in dispelling from the minds of some exceedingly well-disposed and humane persons the hallucination that there is no such disease as rabies and that the officers of this Department are guilty of heartless cruelty in ordering the destruction of affected animals and the tying up or muzzling of dogs which have or may have been exposed to infection.

This mistaken view, most laudable, and properly so, from the standpoint of those who hold it, undoubtedly owes its origin to the fact already stated that, as a result of ignorance, many dogs are cruelly treated and destroyed as mad, when suffering from other ailments or perhaps only from exhaustion or excitement.

Any nervous dog, in a strange place or under abnormal conditions, when worried or hounded as such animals too often are, is liable to act in such a manner as to cause great alarm to persons uninformed as to the true nature and symptoms of rabies.

People who like and understand dogs naturally resent the way in which these unfortunate animals are treated and, going to the other extreme, believe and would have us also believe, that there is no such thing as rabies and that it is quite unnecessary, if not foolish, to take any precautions against it.

Science and fact, however, prove the contrary, and, if an illustration is needed, it is only necessary to point to Great Britain, where, by the adoption, in the first place, of general muzzling orders and subsequently by the enforcement of a rigid



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quarantine, the disease formerly very prevalent, and causing annually the deaths of numbers of bitten persons, has been eradicated and is now quite unknown.

With the disease existing as it does to an alarming extent in the United States, to which country nearly all our outbreaks can be directly traced, and with a land boundary of three thousand miles, it is not possible for Canada to effectually adopt the policy which has been found so successful in the motherland.

The fact that all the outbreaks in Ontario have occurred in the Niagara peninsula and the adjacent counties, would indicate that the infection, so far as this province is concerned, has been introduced from the State of New York, while in the west, it must have been brought in by the dogs of some of our new American settlers.

Two points I would especially like to impress upon the people of Canada:

The first is that a suspected dog should not be killed if it is at all possible to avoid it, but should be driven into a loose box or similar inclosure and detained, pending the arrival of the veterinary inspector of this Department who will be promptly sent to investigate as soon as notification is received.

The second point is that there are kept in Canada, as in many other countries, far too many useless mongrels, which are not only a constant and ready means of conveying the infection of rabies, as well as many other diseases both to man and animals, but constitute besides, a standing and very real menace to one of our most lucrative agricultural industries, namely the breeding and raising of sheep.

There is little to be said against the well bred dog or even the dog of plebeian origin, provided he is properly broken, handled and kept under control, but the practice of allowing dogs to run at large indiscriminately and unattended, especially at night, cannot be too strongly condemned.

Those tender hearted persons who have so much sympathy for dogs might, with advantage, bestow some consideration on the people and the other animals bitten by dogs, rabid or simply vicious, and on the cruelly worried sheep and lambs of the long suffering farmer.

The painless destruction by the lethal chamber or by chloroform, of sixty per cent of our canine population, would, in my opinion, be a most humane measure and one of the greatest possible benefit to the country, its people and its dogs.

I have the honour to be, sir,

Your obedient servant,

J. G. RUTERHFORD.

*Veterinary Director General and Live  
Stock Commissioner.*

To the Honourable,  
The Minister of Agriculture,  
Ottawa, Ont.



## RABIES.

BY GEORGE HILTON, V.S., CHIEF VETERINARY INSPECTOR.

Rabies has been recognized throughout the world for many centuries, and was described before the advent of the Christian era, but there is probably no other contagious disease in animals which has, from ancient times, caused a greater diversity of opinion among authorities, and produced such erroneous ideas in the minds of the general public. There were those who firmly believed rabies was the result of exposure to intense heat, others thought it was caused by extreme thirst, many maintained that undue excitement, and the ingestion of foods rich in nutritive matters would produce it, while by others, climatic changes and certain seasons were held responsible.

Although the contagious nature of rabies has long been acknowledged and its transmission from animal to animal by means of a bite recognized, the possibility of its spontaneous development was nevertheless until very lately generally admitted. It is only during recent years that authorities have agreed that the causative agent of rabies is, without doubt, a specific micro-organism, which must first be introduced into the system of an individual before it is possible for the disease to develop.

While the actual casual agent has not so far been identified, and all attempts to cultivate it on artificial media have been unsuccessful, experiments have conclusively proved that such an organism does exist, but is of such minute proportions, that the most modern microscopic lenses are unable to detect its presence. This has been demonstrated positively by suspending, in liquids, virulent brain matter taken from a rabid animal, and passing it through a porcelain filter, the extremely minute pores of which do not suffice to arrest this micro-organism, as proven by the fact that the liquid after passing through the filters retains its virulence and produces rabies in healthy animals, when inoculated with it.

## MODE OF INFECTION.

The saliva of a rabid animal is its most frequent, and so far as at present known, only means of spreading contagion, this being frequently infective one or two days before the advent of any symptoms of disease. The brain and spinal cord, however, contain the most virulent material after death, these tissues, preferably the former, being, when possible, invariably used in confirming diagnosis where suspicion exists. It is claimed by some that other body fluids contain virulent material, and cases of the transmission of rabies from mother to offspring through the medium of the milk have occasionally been reported, but of this there is no satisfactory proof. In no case, however, has the blood of a rabid animal proved to be of a virulent nature.

Pasteur, who devoted the greater part of his life to investigating this disease, is responsible, directly and indirectly, for the great advance in our knowledge regarding it. In the early eighties he discovered that he could produce rabies in a healthy animal by inoculating it with material taken from the brain or spinal cord of one which had died from that disease, and later, after extending his experiments, found that the vitality of the virus could be reduced by passing it through different animals to such an extent as to produce mild symptoms, followed by recovery, and further that animals so treated acquired immunity to such a degree that the injection of virulent material into their systems produced no bad results. This discovery rapidly found favour in scientific circles throughout the world, and energetic measures were



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adopted for its perfection, so that at the present time Pasteur Institutes are maintained for the treatment of man in all large centres of civilization, where rabies is known to exist. These institutions have reduced the mortality in human beings bitten by rabid animals to such a remarkable degree that the effectiveness of the Pasteur treatment is now universally acknowledged. Rabies is therefore unquestionably a disease of inoculation, and is, in the large majority of cases, transmitted by means of a bite from a rabid animal, the virulent saliva thereby gaining entrance to the wound. The possibility of producing it by means of the ingestion of saliva, milk or meat of infected animals has for some time been a matter of experiment, but sufficient definite satisfactory data have not so far been obtained to determine whether such products may or may not be consumed with impunity.

## SPECIES AFFECTED.

The habits of the dog and his species, the unrestricted freedom which the majority of them enjoy and the fact that biting constitutes their natural mode of defence, make them pre-eminently fitted for the transmission of this disease and responsible for the rapidity with which large outbreaks cover unlimited areas. Rabies is, therefore, naturally, far more frequently seen in canines, and to their species outbreaks in other animals are generally attributable.

Unfortunately, however, man and all warm-blooded animals are susceptible; the horse, ox, sheep, hog, cat, rat and fowl, together with other members of their respective species, domesticated or otherwise, readily develop this disease when bitten by a rabid animal. It is, therefore, not by any means uncommon to find several species affected during the existence of an outbreak in any vicinity.

## NATURAL IMMUNITY.

There are very few cases on record of recovery once the symptoms have developed and these have been reported only by Pasteur and other investigators as occurring in animals experimentally inoculated. The possibility, however, of certain individuals possessing a natural immunity against this disease, as is strikingly apparent in other fatal contagious maladies, must be considered, and such immunity doubtless exists, but probably to a very limited extent.

## PERIOD OF INCUBATION.

As soon as the virus is introduced into the system, unless prompt, energetic and effective measures are adopted to arrest it, or the individual possesses an acquired or natural immunity, the incubative period commences. This may be of short or long duration, much depending upon the vitality and the quantity of virus introduced, the resisting power of the individual organisms, the location of the bite, the favourable or unfavourable facilities afforded for the inward progress of the virus, and the suitability of the surrounding tissues. While the course followed by the virus has not so far been satisfactorily demonstrated, the symptoms exhibited in fatal cases and their examination after death, show clearly that it invariably reaches the large nerve centres.

Numerous cases on record appear to indicate that the nearer the bite is to the brain or spinal cord, the shorter the incubative period, and that when it is in the extremities that period is considerably lengthened. Although the period in question may vary largely, owing to one or other of the causes already mentioned, authorities have through the accumulation of reliable data arrived at the average period in the various species as follows:—



40 days in man.  
28 to 56 days in horses.  
21 to 40 days in dogs.  
14 to 28 days in cats.  
14 to 21 days in pigs.  
21 to 40 days in cattle, goats and sheep.  
14 to 20 days in birds.

#### SYMPTOMS.

The comparative virulence of the organism itself, the quantity introduced and the degree of suitability of the tissues directly inoculated are undoubtedly responsible for the variation of the symptoms observed. These are chiefly of a nervous order, mental excitement or depression being the prominent manifestations. They are generally speaking similar in the different species of animals, and become apparent so soon as the virus and its toxins have developed sufficiently to interfere with the normal functions of the nervous system. The symptoms are sufficiently characteristic to impress their peculiarities upon the mind of the observer and are more easily recognized than described. In all species, however, a marked change in the demeanour of the animal is first noticed by the careful observer. This may be increased excitability, restlessness, viciousness, or dullness. As the disease progresses the symptoms differ in accordance with the location, the distribution of the virus and the rapidity with which the normal structures become affected, and consequently vary from a violent uncontrollable state to one of marked dullness, followed rapidly by partial or complete paralysis and death. The former has been termed Furious Rabies, and the latter Dumb Rabies. Once, however, symptoms become apparent, the duration of the illness is fortunately very limited, death invariably resulting in from two to ten days; in dogs most frequently on the third or fourth day.

#### FURIOUS FORM.

In the furious form in the canine species, individuals noted for their cowardice become aggressive and quarrelsome with other animals, show an inclination to leave their natural place of abode, either permanently or for short intervals. When returning they show evidences of having been in trouble and are frequently in an exhausted condition. They rapidly assume a wild, unnatural expression of countenance, the eyes are prominent, glaring and much reddened, the membrana nictitans or haw projects and is bright red in colour, and a discharge from the eyes may be detected. A peculiar movement of the muscles of the neck is noticeable, producing retching, which may be followed by vomiting, or attempts to vomit, giving the observer the impression that a foreign body is obstructing the throat. The location of the bite is frequently very irritable and appears to annoy the dog continually. He at times tears open the wound and bites it viciously. He becomes very excitable, and may tear his bedding to pieces, snap suddenly and viciously at the least noise, or jump furiously at any object within reach. The flow of saliva now becomes profuse, and soon adheres around the muzzle in a frothy mass, due to the constant barking and snapping of the jaws. The bark becomes unnatural, changing to a shrill puppy yelp.

A short period of quietness may at times intervene, the animal endeavouring to seclude itself; this, however, is generally very brief, furious paroxysms of rage rapidly returning. The patient shows evidence of great thirst, and will lap water frequently when available, although he may, or may not, be able to swallow. Breathing becomes rapid, followed by panting, the mouth remaining open, and extreme depression is exhibited. Sudden noises, or approaching objects produce immediate



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signs of rage, which may also be witnessed when no cause is apparent. He soon is unable to control his movements and paralysis, generally of the hind extremities, supervenes; he, however, persists in spasmodic yelps and feeble attempts to snap at objects, although he is unable to make much noise, due to increasing depression and paralysis. This is rapidly followed by a state of coma; he lies prostrate, unable to move, mouth open, lower jaw dropped, bathed in saliva, extremely emaciated, breathing spasmodically, death speedily taking place. In cases where he shows an inclination to roam he may run continuously across country until he becomes exhausted. His gait is erratic, he trots aimlessly along, unalert and regardless as a rule of his surroundings, with head and tail dropped, tongue hanging from the corner of his mouth, and saliva escaping and frothing around his muzzle. He will seldom attack motionless objects, anything in his path, however, appears to excite him to fury and he will viciously attack animals unfortunate enough to be in his reach.

## DUMB RABIES.

The dumb form of rabies is frequently witnessed in the last stages of the furious form, but does occur independently from the first advent of symptoms. In such cases the animal always seeks cover and remains hidden as much as possible. He exhibits a tendency to vomit, retches with muzzle poked out, becomes very much depressed; paralysis setting in rapidly, the lower jaw drops, he is unable to swallow, saliva flows abundantly and the breathing is laboured and accompanied by a slight snoring sound. There are no paroxysms of rage; the facial expression is similar to that witnessed in the furious form, rapid emaciation sets in, followed by complete paralysis and coma, resulting in death.

The symptoms enumerated necessarily vary in degree in different individuals, and are sometimes sufficiently acute to cause death in a paroxysm of rage without the advent of a comatose condition.

It is well, however, to look with suspicion upon a dog whose demeanour suddenly changes. If he becomes restless, wanders away, refuses food, continually retches, attempts to vomit, snaps at objects, and rapidly loses flesh, especially if a strange dog has previously been observed on the premises, or if rabies has been suspected in the vicinity, he should be promptly detained, safely secured where no other animal can come in contact with him, and closely watched. If rabies is the cause of the symptoms noted, death will quickly ensue.

## CAT.

Cases of rabies are less numerous in cats than in the other domestic animals. This is no doubt due to the dexterity with which they are able to escape from their pursuers, the conditions under which they live, their strong antipathy for dogs, and the fact that they seldom when caught by him escape alive. When, however, infection does take place the disease progresses very rapidly, terminating fatally about the third day from the commencement of symptoms. These are frequently not seen, as the infected animal often hides away, and is not found until either death is approaching, or has taken place. In other cases, the animal is extremely restless and excitable, moves about persistently in an erratic manner, and seldom remains at ease. The eyes assume an unusual brilliancy, the pupils are dilated, resulting in a wild frightened expression. Great thirst is apparent, but there is no desire for food. He shows a tendency, however, to pick up and swallow stones, sticks, and other foreign bodies. The voice rapidly changes to a loud harsh tone. He may run from one secluded spot to another constantly, mewing in a loud, harsh, unnatural, screechy manner. Saliva flows profusely, which with the persistent licking, frequently ap-



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parent, soon moistens the coat of the animal, and adds to its dejected appearance. Any noise or excitement may be followed by paroxysms; these may occur frequently or occasionally, during which the animal jumps about furiously, and will attack a dog, or other animal or man, biting and scratching savagely. Emaciation is rapid and complete, paralysis soon takes place, followed quickly by death.

#### WILD ANIMALS.

Foxes, wolves, coyotes being in many respects closely allied to the dog, exhibit similar symptoms when rabid. They become bold and venture into public roads, pastures and barnyards, often attacking domestic animals, and are therefore occasionally the cause of outbreaks in areas previously uninfected.

#### CATTLE.

Cattle affected with rabies may exhibit a wild, staring look, the eyes being particularly bright, or on the other hand, an unusually mild expression may be noticeable. The former condition denotes an increased excitability of the nervous system, and violent symptoms frequently follow. If secured in the stall, the animal will suddenly bellow in a terror-stricken manner, pull forward and backward strenuously in its fastenings, stamp its feet determinedly, shake its head violently and butt viciously at any object. A period of calmness may intervene, the animal standing quietly with head slightly elevated; spasmodic twitching of the muscles of the neck may now be noticeable, accompanied by frequent blinking of the eyelids. It may even at such times show signs of restlessness and may kick occasionally at its abdomen, probably from abdominal pain.

A strong desire to lick objects in reach is apparent, the patient doing so persistently. The flow of saliva is profuse and the animal shows no desire for food. A sudden fit of rage may follow, perhaps induced by an approaching object; the patient lashes its tail, bellows loudly with a hoarse, unnatural sound, shakes its head violently, butts wickedly at the manger or wall, and may bite savagely at the former, lacerating the palate and dental pad. The flow of saliva now assumes a bloody hue and adds considerably to the wild, unnatural appearance of the animal.

As the disease progresses the animal rapidly weakens and now becomes markedly emaciated, paralysis quickly follows, affecting the muscles of the throat and hind-quarters. The patient soon falls, is unable to rise, and may sink into a state of coma and die rapidly, or may struggle persistently for a considerable time, until death takes place.

In cases where the animal is not under restraint, the symptoms may be of even a more violent nature; he rushes wildly about, leaps into the air, bellows loudly and butts viciously at any animal in reach until weakness or paralysis force him to desist.

While the symptoms in cattle are most frequently of a very violent nature, they are occasionally ushered in by extreme lassitude, denoted by an unusually mild expression, or one of marked dejection. Continued yawning is apparent, shifting of the feet alternately, pronounced dullness, twitching of the muscles of the neck and face, followed by great stupor. Smacking of the lips and grinding of the teeth may be noticeable and an increased flow of saliva is generally a prominent symptom. Emaciation and paralysis rapidly follow, the patient lies down or falls and death occurs usually from the fourth to sixth day after the commencement of illness.

#### SHEEP.

In sheep a change in demeanour is quickly noticeable, their heads are generally carried erect, the eyes assume an exceedingly bright appearance, and may roll in



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their sockets, due to the involuntary twitching of their motor muscles. Excessive grinding of the teeth is a prominent symptom. When approached they frequently give vent to a peculiar wheezing sound, which terminates abruptly, due to a sudden expiration of air through the nostrils. They bleat frequently with a loud, hoarse sound. They may stamp with the forelegs, and often jump like a dog at any object out of reach. They also exhibit a great desire for licking, are exceedingly quarrelsome, and frequently run and butt viciously at any other animal. Their expression is invariably one of extreme excitement, and they have been known to bite savagely at other animals. The flow of saliva is profuse and the appetite disappears soon after the first symptoms are detected. As the disease progresses weakness and emaciation are marked symptoms, causing the animal to stagger and fall, convulsions follow and death rapidly ensues, generally taking place from the second to the fifth day after the commencement of illness. In some cases, however, paralysis may be the first symptom detected; the animal is found down and unable to rise, with the same excited facial expression, twitching of the muscles, rolling of the eyes, heavy breathing, grinding of the teeth, and a profuse flow of saliva; emaciation becomes marked, and convulsions occur at irregular intervals, rapidly terminating in death.

## HOGS.

The rabid hog shows a strong tendency to hide in the most secluded spot available, and will suddenly, without apparent cause rush out and run in evident terror, grunting and squealing loudly. His expression is one denoting extreme fear, with an unusual brilliancy in the eyes. Although his normal appetite is generally in abeyance, he exhibits a tendency to chew wood and other articles, and may persist in so doing for lengthy periods. The flow of saliva is markedly increased, the patient continually champing his jaws and showing signs of extreme restlessness. He will occasionally rush at his fellows or other animals, bite savagely, and if a boar, use his tusks viciously. Paralysis of the muscles of the throat and hindquarters rapidly intervenes and emaciation and weakness become markedly apparent, followed by convulsions, terminating quickly in death, which generally takes place from the first to the sixth day. The symptoms are subject, as in other species, to varied degrees of severity, and may be ushered in by extreme depression, quickly followed by paralysis without the appearance of any violent manifestations.

## HORSES.

In the horse a change of demeanour is also first noticeable. He exhibits either great excitability or depression. In the former case his expression is one of keen alertness, ears erect, eyes exceedingly bright and blood shot, exhibiting a wild glassy stare. His appetite becomes impaired and is soon altogether absent. He is extremely restless; twitching of the muscles may be noticeable, together with quick spasmodic movements of the eyes, and the membrana nictitans (haw). He may get up and down, roll, and shake his head repeatedly. The least noise is sufficient to temporarily increase the symptoms, he will kick suddenly at any object, neigh frequently, and may gnaw persistently on manger, stall or fence. There may be intense irritation at the seat of the bite, the animal licking and finally chewing it viciously. Cases have been reported where the patient has gnawed through the muscles to the bony tissues, and persisted in doing so until approaching paralysis intervened.

Violent paroxysms are common, causing the animal to kick dangerously; he will frequently rush and bite savagely at the manger, burying his teeth in the woodwork.



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The symptoms become extremely aggravated, the animal smashing the stall to pieces, and even occasionally breaking his way out of the stable. Extreme thirst is evident the flow of saliva profuse; he grinds his teeth frequently and will suddenly snort loudly. Swallowing becomes difficult, resulting in the return of food through the nostrils. His movements become stiff and jerky, he exhibits marked vicious tendencies and will rush and bite other animals in a determined manner. As the disease progresses he becomes very much emaciated, convulsions frequently take place, which may terminate in death.

In other cases the symptoms are ushered in by depression and stupidity. There may be involuntary muscular twitching, irregular movements of the eyes, which assume a prominent, reddened, unnatural appearance. The animal breathes with a snuffling noise, and in a laboured, jerky manner. He frequently persists in pressing his head forward against the manger or wall, often grinding his teeth. As the disease progresses he knuckles over on the fetlocks, staggers, sways, and finally falls unable to rise, or to do so only with difficulty. Emaciation is marked, the flow of saliva is noticeably increased, he may bury his teeth in the ground, flooring or any convenient object, remaining in this position for short or prolonged intervals. Convulsions follow, which become more severe with each recurring attack, ultimately resulting in death from four to six days from the advent of the first symptoms.

#### POST MORTEM APPEARANCES.

The carcasses of animals succumbing from this disease are extremely emaciated, and the post-mortem findings are not of a marked nature, the alterations in the tissues being often but slightly discernible even to the experienced eye. The lining of the mouth and throat frequently shows evidence of congestion, as does also that of the stomach, on the surface of which hemorrhagic spots may be fairly well distributed.

In view of the depraved appetite so often witnessed in affected animals, foreign bodies are frequently found in the stomach, such as sticks, stones, dirt, and similar articles. It is seldom, however, that this organ contains food, and when much is found present it is a fairly safe indication that rabies was not the cause of death.

While the brain, spinal cord, and their membranes contain the most virulent material, they seldom exhibit marked visible changes. Evidences of congestion, with an increase of the fluids, may be detected, but the important pathological changes even here are of microscopic proportions. Pathologists have naturally directed their attention for years to the microscopic study of the nerve tissues, with a view to discovering some constant, definite characteristic alteration therein, which would enable them to arrive at a positive diagnosis more promptly than is possible by animal inoculation. Van Gehuchten, Nelis and Ravenel, have shown that certain changes occur in the nerve cells of the *plexiform ganglia*, while Negri more recently demonstrated the evidence of peculiar staining granules within the nerve cells of the brain taken from animals dying from this disease. The latter have been termed the 'Negri bodies,' and while generally accepted, and largely adopted by pathologists as a rapid means of diagnosis, the fact remains that the same bodies have also been detected in the brain cells of animals, which have later been proved conclusively to have died from causes other than rabies. It is, therefore, quite evident that while progress has been made, it has not been sufficient to furnish a reliable substitute for animal inoculation as a means of certain diagnosis.

#### BITTEN PERSONS AND ANIMALS.

In conclusion it cannot be stated too emphatically that the bite of a dog, or any other animal, will not under any circumstances transmit rabies, unless that animal is, at the time of biting, affected with the disease.



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It is, therefore, most important, in cases of biting of a suspicious nature, to detain securely the animal that inflicts the bite, and no danger need be apprehended, if symptoms do not develop in the course of a few days.

If, as is too frequently done in such cases, the animal is destroyed at once, there is much doubt and delay in obtaining proof as to whether it was rabid or not. This is important, as the mere fact of having been bitten by an animal, even though there is no ground for suspicion, may in view of the erroneous imaginary theories, which have passed down from generation to generation, result seriously in an individual of nervous temperament.

For this reason there is probably no other communicable disease of the lower animals in which the exercise of extreme caution, commonsense, and good sound judgment is of such paramount importance.

When valuable animals are bitten a veterinarian should be promptly consulted, and awaiting his arrival every attempt made to encourage bleeding. It is advisable to leave further treatment of the wound to the veterinarian, unless undue delay is experienced in which case pure nitric acid is probably the preferable agent to use. This should be dropped carefully into the wound, while the latter is being thoroughly massaged, in order to ensure the penetration of the acid to its depths.

In cases, however, where the least suspicion of rabies exists, and any human being has unfortunately been bitten, no time should be lost in procuring the services of a physician, and the same precautionary measures promptly adopted.

## RABIES (HYDROPHOBIA).

An animal suspected of being affected with rabies (hydrophobia) should, if possible, be captured alive, placed in a cage where it can do no harm, and carefully watched. If affected with rabies, symptoms will appear within forty-eight hours, and death will, as a rule, occur within a few days. Affected animals are scarcely ever known to recover.

In order that other causes of death may be excluded, material should be forwarded to the laboratory for confirmatory diagnosis. If the time necessary for transmission to the laboratory does not exceed twenty-four hours, the head may be severed from the body and forwarded by express packed in ice. In winter, the severed head, if frozen, may be sent any distance, provided instructions are given to keep frozen.

Where the distance from the laboratory exceeds twenty-four hours, a portion of the brain or spinal cord (the medulla or base of the brain is preferred) may be placed in pure glycerine and forwarded by mail. There should be an excess of glycerine over the bulk of material forwarded.

Full information as to history, clinical symptoms, etc., should also be furnished. Specimens should be addressed:

Biological Laboratory,  
Ottawa, Canada.



## DOMINION OF CANADA.

## REGULATIONS RELATING TO RABIES.

*By Order in Council dated 10th August, 1905, in virtue of 'The Animal Contagious Diseases Act, 1903, R. S. C., 1906.'*

1. No dog or other animal which is affected with or has been exposed to the infection of rabies, shall be permitted to run at large, or to come in contact with other animals.

2. Any Veterinary Inspector may declare to be an infected place within the meaning of 'The Animal Contagious Diseases Act, 1903, R. S. C., 1906,' any place or premises where the infection of rabies is known or suspected to exist.

3. Veterinary Inspectors are hereby authorized to order the slaughter of any dog or other animal affected with rabies, or suspected of being so affected, and to order the disposition of the carcase of such animal.

4. Veterinary Inspectors are hereby authorized to order dogs or other animals which have been exposed to the infection of rabies to be detained, isolated or muzzled.

5. No dog or other animal, nor any part thereof, shall be removed out of an infected place without a license signed by an inspector.

6. Every yard, stable or outhouse, or other place or premises, and every wagon, cart, carriage, car or other vehicle, and every vessel and every utensil or other thing infected or suspected of being infected with rabies, shall be thoroughly cleansed and disinfected by and at the expense of the owner or occupier in a manner satisfactory to a Veterinary Inspector.

7. On receiving the report of an Inspector to the effect that rabies is known or suspected to exist in any locality, the Minister of Agriculture may order that all dogs, or other animals, within such an area as he may determine or describe, shall be detained, isolated or muzzled in such manner and during such period as he may see fit.

J. G. RUTHERFORD,

*Veterinary Director General.*

HEALTH OF ANIMALS BRANCH,  
DEPARTMENT OF AGRICULTURE,  
OTTAWA.



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*Attention is Specially Drawn to the Following Sections of 'The Animal Contagious Diseases Act 1903,' R.S.C., 1906.*

Section 3.—Every owner of animals and every breeder of or dealer in animals, and every one bringing animals into Canada shall, on perceiving the appearance of infections or contagious disease among animals owned by him or under his special care, give immediate notice to the minister and to the nearest veterinary inspector of the Department of Agriculture, of the facts discovered by him as aforesaid.

2. Any veterinary surgeon practising in Canada shall, immediately on ascertaining that an animal is labouring under an infectious or contagious disease, give similar notice to the Minister and to the nearest veterinary inspector.

Section 23.—Whenever under this Act a place has been constituted an infected place, no live animal, nor the flesh, head, hide, skin, hair, wool or offal of any animal or any part thereof, nor the carcass nor any remains of any animal, nor any dung of animals, nor any hay, straw, litter or other thing commonly used for and about animals, shall be removed out of the infected place, without a license signed by an inspector appointed as aforesaid until said place has been released by order of the Minister.

Section 37.—Every person who brings or attempts to bring into any market, fair or other place, any animal known by him to be infected with or labouring under any infectious or contagious disease, shall, for every such offence, incur a penalty not exceeding two hundred dollars.

Section 41.—Every person who refuses to admit any inspector or other officer into any place or premises or any steamship, vessel or boat, or any carriage, car, truck, horsebox or other vehicle used for the carriage of animals, or who obstructs or impedes the execution of any order or regulation made by the Governor in Council or the Minister under this Act, shall for every such offence, incur a penalty not exceeding one hundred dollars; and the inspector or other officer may apprehend the offender and take him forthwith before a justice of the peace to be dealt with according to law; but no person so apprehended shall be detained in custody, without the order of a justice, longer than twenty-four hours.

Section 46.—Every person who violates any provision of this Act, or of any regulation made by the Governor in Council or by the Minister, under the authority of this Act, in respect to which no penalty is hereinbefore provided, shall, for every such offence, incur a penalty not exceeding two hundred dollars.



## APPENDIX No. 12.

## THE CATTLE TRADE OF WESTERN CANADA.

BY J. G. RUTHERFORD, VETERINARY DIRECTOR GENERAL AND LIVE STOCK COMMISSIONER.

OTTAWA, March 31st, 1910.

SIR,—Ever since July, 1906, when you added to my other duties those pertaining to the office of Live Stock Commissioner, I have been quietly investigating the conditions surrounding the commercial live stock trade of Canada. To this subject comparatively little attention had previously been given, my predecessor having devoted more time and effort to the interests of the breeders of pure bred stock than to those of the ordinary farmer and feeder.

This was doubtless both proper and necessary, the pure bred herd or flock being the foundation head of all profitable stock keeping, and therefore of prime importance to the whole industry.

It is nevertheless a fact that in Canada, as elsewhere, the breeders of pure bred stock are more independent and less needful of government assistance than any other class in the farming community, excepting perhaps the original settlers on the western prairie, who, certain of a rich return, and reckless of the future, too often exploit the virgin soil with a fine disregard of all the principles of husbandry.

The breeder is independent of government aid for two reasons: firstly, because he is a breeder and therefore, as a rule, a man of more enterprise, and wider knowledge of business methods than the majority of his fellow tillers of the soil, and, secondly, because, being united with others equally intelligent, in one or more thoroughly organized and active breed associations, he is in a position to reach a definite decision as to what his rights and requirements are, and to apply to those in authority the pressure of persuasion to obtain them.

On the other hand, the breeder or feeder of ordinary live stock pays but little attention to the commercial aspect of his business, and being, as a rule, without organization, is at the mercy, to a large extent, of the dealer, to whom he is practically forced to sell and who is generally more than a match for him in experience and acumen, and besides, often in a position to dictate his own terms as to price and delivery.

In view of these facts, I deemed it my duty to endeavour to ascertain and present to you a summary of the facts as to the conditions under which our commercial live stock trade is being carried on, so as to enable you to take such steps as might appear to be necessary or advisable in the interests of the producers. The present report is confined almost entirely to the cattle trade of the western provinces, as of all branches of the business, this appears to me to be subject to the most numerous and serious disabilities and disadvantages.

You will recollect that in 1902, at your special request, I prepared a brief statement regarding this trade, dealing specially with transportation, which was published in your annual report for that year. Since that time conditions have been somewhat bettered, but there is yet much room for improvement, particularly in the matters of transportation and marketing.

During the seasons of 1907 and 1908 special officers were employed to investigate all phases of the western cattle industry, beginning with the animal on the ranche and ending with his marketing either on this continent or in Europe.



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The reports of these officers, which deal very fully with the details of the trade and especially with its transportation features, contain much valuable information, and will, I trust, be of great value in enabling the Department to undertake intelligently, either by special legislation or otherwise, the improvement of existing conditions.

As is well known the Canadian west is now experiencing the same change in cattle raising methods as has already taken place in much of the country south of the line, formerly devoted to ranching purposes.

The incoming of settlers, many of them from the dry belt, has transformed large areas of land, formerly considered only fit for ranching, into fertile farms growing great crops of grain and fodder. While there is yet much territory untouched by the settler and on which the cattle still range as formerly, its area is being yearly curtailed, and, as a natural consequence, the free, easy and somewhat wasteful methods of the rancher are gradually giving place to those of the farmer and feeder. That this change will, instead of lessening the output, eventually result in a large increase in the cattle production of the transformed districts, needs no demonstration. Under ranching conditions, twenty acres is the usual allowance for each head of cattle, while the losses from exposure, from lack of food and from wild animals constitute a heavy drain on the herd.

The farming settler raises an abundance of food of all kinds which he cannot use to better advantage than in fattening cattle. With the aid of his fences and with cheap buildings, or even with none, he can keep his cattle under constant observation and control, with the result that loss is reduced to a minimum. At the same time the cattle, being at least partly domesticated, and generally to some extent grain fed, handle and ship infinitely better than do the grass finished range steers which often, on the long journey from their native prairie to Liverpool or London, shrink the profit from their bones, and go to the butcher in such a condition as to fairly justify the Scottish feeder in his persistent opinion that Canadian cattle can only be fattened in his sheds and courts.

Again, the winter feeding of steers will abolish the heavy handicap which the rancher, pure and simple, has always had to carry in being compelled to market the cattle off the grass and before the advent of winter. Under the new order of things, demand will, to a much greater extent, regulate supply, and the element of compulsion being removed, prices will be more even, while much of the present difficulty in transportation, due to the seaward rush of cattle and other produce in the fall, will also disappear.

The close farmers are, as yet, however, in the minority in the less thickly settled portions of Alberta and Saskatchewan. There is still much open grazing land available and many settlers let their cattle run at large during the summer, thus, for the present as it were, combining ranching with farming. As time goes on and the land becomes more generally taken up, this condition will disappear, as it has already done in many districts in Manitoba, as well as in the newer west, and the farmer will have to depend for his feed on the output of his own acres.

## HISTORY OF THE CANADIAN RANGE.

The ranching industry in Canada is rapidly passing. In Saskatchewan and Alberta, the handwriting is already on the wall, and in these provinces it is only a matter of time until even the districts still regarded as unfit for general agriculture will, through modern methods of dry farming or by means of irrigation, be brought under cultivation. In the Peace River country ranching may persist for a time, but there, as elsewhere on this continent, the settler will soon be its undoing and the cow-



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boy will disappear. This being the case, a brief history of the industry during the thirty years since its inception, may be found interesting.

In 1879, after the disappearance of the buffalo, which had up till that time, furnished the Indians of the plains with their principal sustenance, the Canadian Government brought in from Montana a thousand head of breeding cattle for the purpose of creating a future source of meat supply for these aboriginal wards of the nation.

This herd, the introduction of which was largely in the nature of an experiment, was placed in the foothill country west and southwest of Fort Macleod, and though badly handled and depleted by cattle thieves and wild animals, soon proved beyond a doubt, that the profitable raising of cattle in the Canadian west was a feasible proposition.

The establishment of a number of extensive ranches quickly followed. Arrangements were made for the leasing at low rates of large areas of government land. Capitalists became interested, and money from Europe, from eastern Canada, and from the United States flowed into the country. From lack of experience of climatic and other local conditions, some of this money was lost, but with the advent of the railway in 1883, conditions improved and a large and profitable industry was speedily built up.

In the beginning, fences were unknown, the cattle being controlled by herders, but about 1885 the proprietary instinct began to assert itself and many of the larger holdings were put under fences, although, needless to say, the smaller owners continued to prefer the open range system.

The big concerns used almost exclusively pure bred bulls of the beef breeds, and, as the grazing was good and not over-stocked, usually held their steers until at least four years old, the result being that a most excellent type of beef animal, full grown, and well finished, began to find its way from Alberta to the eastern market. Being mature and well furnished with fat in the fall, driven slowly, feeding and hardening on the way through a rich grazing country to the railway, distant often many days' journey from the home ranch, these cattle stood the trials of the export journey fairly well, and landed in Britain, somewhat shrunken it is true, but still yielding a reasonable profit on the comparatively small cost of production. In the early days of the industry, only the best were exported. The lighter and rougher stock went for local consumption and to fill railway construction and Indian contracts.

#### DETERIORATION.

As time went on the country became more heavily stocked, many men without adequate capital or experience began to keep cattle, cross-bred bulls became commoner on the range, carelessness in breeding methods lowered the natural increase, the purchase of stockers first from Manitoba and later from the eastern provinces introduced many very inferior animals, and a general deterioration both in quality and value became only too evident.

The climax of this deterioration was reached about the year 1902 when, tempted by the low prices of Mexican cattle, some of the larger ranchers began to make importations from Chihuahua and Coahuila. These degenerate descendants of the ancient Spanish breed, although hardy and exceeding in length of horn, as in length of wind and in speed, anything ever before seen among our western cattle, did not recommend themselves to the intelligence of the Canadian rancher, and, after a few years of trial, the trade practically died out in 1905.

#### SALES OF PURE BRED MALES.

About the same time the effects of the policy of this Department in establishing annual provincial auction sales of pure bred bulls began to make themselves apparent.

These sales, although to some extent hampered by the jealousies of local breeders, as well as by the indifference of many of the less intelligent and less progressive



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ranchers, have done an excellent work in raising the standard of our western cattle, as regards size and conformation.

There is still much room for improvement in this direction, and it is to be hoped that as diversified husbandry takes the place of ranching, the necessity for using a better class of bulls than those hitherto employed will be more generally recognized and appreciated.

## EFFECTS OF SETTLEMENT.

The advent of the Mormons and others familiar with dry farming and the experience of a few of the more progressive ranchers themselves, especially in the Pincher Creek district, having demonstrated the suitability of much of the country for general farming, a strong tide of immigration set in about the year 1900, and since that time, many of the old ranches have been divided, cultivated and built upon, and now form populous rural areas, rapidly beginning to resemble in appearance similar districts in the older settled provinces.

At the present date, while many of the larger ranches have closed out, the cattle industry is by no means at an end. It is true that many cattlemen, seeing the inevitable end of ranching, have been rapidly 'beefing' out their herds by selling cows, spaying heifers and disposing of bulls, but this is only a link in the chain connecting the old with the new and better condition of the industry. The determination to beef out has temporarily increased the output of cattle of range quality, but, while this is going on, the incoming settlers are stocking up, not to return to the old system of selling their cattle off the grass in the fall, but to follow the more profitable method of finishing beef throughout the year for the good markets, as is done in other progressive countries, where beef raising is recognized as a legitimate and useful adjunct to mixed farming.

The condition of the range industry was described in striking terms by a representative western cattleman, at the National Live Stock Convention, in February, 1908, who said:—'No one at all familiar with the ranching industry will hesitate to state that it is in a condition of rapid decline, dying as decently and as quickly as it is financially able to do.' It is not yet dead, however; there were still in force in the four western provinces, on April 1, 1908, 939 grazing leases, involving 3,259,271 acres divided as follows:—Manitoba, 12,642 acres; Saskatchewan, 632,493 acres; Alberta, 2,132,718 acres; British Columbia, 281,418 acres. The average area under lease is 3,481 acres. It would therefore appear that there are still a good many cattle kept under the old conditions, even when the sheep and horse leases are taken into consideration.

## WINTER LOSSES.

From its very inception the ranching industry was subject to winter losses, more or less severe according to the nature of the weather, as well as that of the rancher himself. Even in the worst winters those herds whose owners had made reasonable provision for bad weather conditions escaped, as a rule, with comparatively little loss, although they also occasionally suffered heavily through sudden storms, which coming early in the season, drifted the cattle so far away from the stores of fodder prepared for them that it was impossible to get them back before the advent of spring, or until a timely chinook enabled the cowmen to collect from far and near the remnants of the herd.

The winter of 1886-7 was almost fatal to the industry, being unequalled in severity by any season, either before or after, until the memorable year of 1906-7 when approximately fifty per cent of the cattle on the range were lost.



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In the year first mentioned, however, there was much more grass and many fewer cattle, while on the ranges then occupied there was considerable natural shelter, so that, although badly hit and sorely discouraged, the ranchers did not abandon the field, but investing new capital and energy, soon regained the ground they had lost.

As stated above, the rancher who makes adequate provision for a bad winter, may through unforeseen circumstances, lose heavily in spite of his foresight; on the other hand the careless and improvident owner, who trusts to luck and stores no hay for winter use, is certain to be seriously hit, should the season prove exceptionally rigorous.

Apart from the mere question of money, the practice followed by too many owners of facing the possibilities of the winter without laying in at least enough fodder to sustain life, is cruel and reprehensible to a degree, and should, I think, be made the subject of drastic legislation.

It would be possible to go much more deeply into the question and, in fact, to practically show by a consideration of its various demerits, that while in its own time and place it served a useful purpose, the ranching industry has properly had its day, and that its early disappearance from southern Alberta and Saskatchewan need, except perhaps from the standpoint of sentiment, cause no deep or lasting regret.

### THE TRADE AS NOW CONDUCTED.

The export trade in western range cattle, as hitherto carried on, has been sinfully wasteful, unbusinesslike and unprofitable to the producer. Cattle wild, excitable and soft off grass, are driven to the railway, held sometimes for days on poor pasture waiting for cars, and finally, after more or less unavoidably rough handling, are forced on board. Once in the cars, they are, not unfrequently, run through to Winnipeg without being unloaded for feed or water. It is 840 miles from Calgary to Winnipeg, and as many shipments originate beyond the first-named point, it may be readily seen what this means, even when the run is a good one. Some shippers unload at Moosejaw, 440 miles west of Winnipeg, but others claim that it is alike more humane and more profitable to run through, as the cattle, being still wild, excited and unaccustomed to handling, not only refuse both feed and water, but suffer much more in the unloading and reloading than they do when left in the cars. On arrival at Winnipeg they are always unloaded, fed and watered, being, by this time hungry, thirsty, and fairly quiet from exhaustion. After being rested they are inspected, culled and reloaded, the next step being, as a rule, at White River, 678 miles further east. There they are again fed and watered and after another stage of 755 miles, arrive at Montreal. Here for most of them the land journey ends, although when navigation is closed at that point, it extends to Portland, Boston or St. John, New Brunswick, as the case may be; very rarely to Halifax. At Montreal, however, all are unloaded, fed, watered, rested, and carefully inspected by the veterinary officers of this Department, whether they are to be shipped by water from there or from some other port. If the latter, they are on arrival, rested and again inspected before going on board the steamer.

While the facilities for loading cattle on the ship at St. John are excellent, those at Montreal are not of the best, and this necessitates more and somewhat rougher handling than would otherwise be the case. Even on the ships there is much room for improvement in conditions. The regulations as regards space, fittings and similar matters, are, oddly enough, drawn up and enforced by the Department of Marine and Fisheries, and although these might, in my opinion, be revised with advantage, this is scarcely the proper place to discuss them.

One matter, however, I must mention, namely the class of men employed to look after and care for the cattle on our Canadian ships. These are, as a rule, picked up indiscriminately, through agents at the port of shipment. These men, known in the



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trade as 'stiffs,' are often returning emigrants, who have failed, through drink or other causes, in making things go in Canada, or sometimes simply men looking for a cheap passage, decent enough perhaps, but with no knowledge of cattle, and in many cases quite unaccustomed to the sea. Such men are frequently incapacitated for duty through seasickness, and, in other cases, simply refuse to work, with the result that any who may be capable and industrious are overwrought and the cattle suffer accordingly. In rough weather especially, the feeding and watering are apt to be irregular and insufficient.

Is it a matter for wonder that after a journey of 5,000 miles, made under such conditions, our grass-fed range steers arrive in British lairages gaunt and shrunk, looking more like stockers than beeves, that our Scottish friends think we have no feed, or that I should declare a business so conducted as sinfully wasteful?

And still it is profitable; profitable to the middleman who, coolly reckoning on the shrinkage, fixes accordingly his price to the producer; profitable to the commission man who pockets in commission what the middleman takes in profits; profitable to the railway companies; profitable to the steamship lines and profitable to the British butcher who pays only for what he gets and not even that much if, by combination or sharp practice of other kinds, he can manage to keep prices down. To the producer, however, and therefore to the country, it is the very reverse, and the odd feature of it all is that if conditions were so amended as to make it profitable for them, the others mentioned above would gain, rather than lose, by the change.

## AS IT SHOULD BE.

No wild, grass-finished cattle should be shipped for export. In a country like western Canada which, one year with another, is full of all kinds of material for winter-feeding, there is no excuse for the sending forward, for immediate export, animals which, owing to their lack of domestication and the nature of their food, cannot, under ordinary circumstances reach their destination on the British market without a woeful depreciation in both quantity and quality of flesh.

Our friends in the United States long ago realized the folly of shipping to Europe alive, steers direct from the range. Their range cattle are brought to the middle west, dehorned, if this has not been earlier done; fed for at least sixty days on a ration comprising a liberal allowance of grain, then sent to the market, generally in Chicago, and carefully inspected and culled. Those deemed fit for export are then taken to the seaboard by fast trains and in cars specially fitted for feeding and watering en route. They are loaded on these cars under careful supervision, no overcrowding or rough handling being permitted. The men in charge are almost invariably regular salaried employees of the shipping firms, and the same is true of the foremen on the ships and of those working under them.

As a result of these superior methods, United States cattle, even when originally from the western ranges, arrive in Britain in much better condition than Canadian range cattle, and of course command correspondingly higher prices.

Domesticated Canadians, properly finished, land, as a rule, in excellent condition, and compete closely in price with the best States cattle of the same class. There is no reason why our Canadian range cattle, if treated on similar lines, should not compete as closely with steers from the Western States.

**Finishing Range Cattle.**

As a matter of fact, considerable improvement is already taking place in the finishing of western cattle, as year by year more winter feeding is undertaken. Many thousands of good steers are, in the autumn, put on a hay or grain ration for the winter. When the feeding is liberal and judicious and good water available, the grass flesh is not only held, but gains on hay alone, of from 80 to 125 pounds, and from hay



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and grain up to 400 pounds, are not uncommon. The cattle thus wintered are ready for the spring market, on which they usually sell well, prices always being better at that season, the demand good, and, as but few cattle are being handled, shipping facilities much better. Winter feeding is now systematically carried on by some of the largest operators in the west.

Arrangements are yearly made by one firm with individual farmers throughout the country to feed during the winter at a fixed price per head per month. The cattle are handed over to these men on the approach of hard weather and taken from them when wanted. While many are slaughtered for home and coast consumption, a large number may now be seen during May and June at the Winnipeg yards on their way to the British market, where, needless to say, they get a much more favourable reception than do those which come direct from the range.

A carefully prepared estimate of the number of cattle on feed in central Alberta during the winter of 1908-9, gives 6,000 head being fed in small lots by individual farmers, and 2,000 head by large concerns. It is believed that 75 per cent of these were receiving a grain ration, and 25 per cent hay alone. In the southern part of the province, additional large numbers, of which reliable statistics are not available, were also fattened.

The growth of the practice of finishing cattle on dry feed (hay or hay and grain) in the three western provinces, is indicated by statistics of shipments received at Winnipeg from January to June (fed on dry feed), as compared with the shipments from July to December (grass fed) for the years 1906, 1907 and 1908, as follows:—

Number of cattle shipped east from Winnipeg, January to June, 1906.. . .	9,435
Number of cattle shipped east from Winnipeg, July to December, 1906..	81,609
Number of cattle received for local use, January to June, 1906.. . . .	9,135
Number of cattle received for local use, July to December, 1906.. . . .	31,462
	<hr/>
	131,641
Number of cattle shipped east from Winnipeg, January to June, 1907.. . .	1,487
Number of cattle shipped east from Winnipeg, July to December, 1907.. . .	50,062
Number of cattle received for local use, January to June, 1907.. . . .	16,397
Number of cattle received for local use, July to December, 1907.. . . .	32,254
	<hr/>
	100,200
Number of cattle shipped east from Winnipeg, January to June, 1908.. . .	19,531
Number of cattle shipped east from Winnipeg, July to December, 1908.. . .	86,593
Number of cattle received for local use, January to June, 1908.. . . .	22,342
Number of cattle received for local use, July to December, 1908.. . . .	41,622
	<hr/>
	170,088

The above tables show the percentage of dry fed cattle arriving at Winnipeg for the past three years to have been as follows:—

1906.. . . . .	16.37 per cent.
1907.. . . . .	21.62 “
1908.. . . . .	48.67 “

The shipments via Winnipeg in no sense include all the cattle produced in the three prairie provinces. To these must be added the large quantity of beef consumed in the local markets, in addition to that shipped to British Columbia and the Yukon. It appears safe to infer that the percentage of winter fed catttle that have gone to



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Winnipeg, as shown by the above tables, indicates fairly accurately the relative proportion of these to grass-fattened stock produced in the three provinces. These tables further indicate that within a few years comparatively few lean, or rather half-fed cattle will be shipped from western Canada for immediate killing.

This is an excellent showing, as far as it goes, but I am satisfied that, one year with another, a profitable business can be done by farmers in the grain growing districts of the three western provinces, in finishing for the market, the big growthy grass-fed steers from the range country. In seasons when rough grains are scarce or dear, it would not, of course, be so profitable as when these were cheap and plentiful. There is almost always roughage in abundance. In many districts good prairie hay is procurable at small cost, while straw is always available and can, as Mr. Bedford and many others have shown, be fed with profit, when intelligence and some other things are in the combination. Once in a while too there is a little frozen wheat in the country, and in years when this is the case, the best market for it is usually to be found among the live stock, if one is fortunate enough to have them.

With the object of encouraging the proper finishing of range cattle in the west, this branch has for two seasons offered to a number of selected farmers in Manitoba and Saskatchewan, who have suitable locations and would undertake the finishing of range steers in winter on their farms, a bonus of two cents per pound of gain on such cattle fed by them. It is not desired that the cattle be housed, but fed either in open sheds or naturally sheltered locations.

Sufficient evidence is at hand to demonstrate that profitable finishing can be done without the use of expensive buildings and upon such feed as is now being wasted on many wheat farms. The bonus offered was not in any case accepted, farmers, intending to feed, preferring to utilize the semi-domesticated cattle available in most districts, rather than undertake the feeding of range steers to which they were unaccustomed.

Outdoor feeding was, however, undertaken at the Experimental Farm at Brandon. where in the tests made in 1907-8, it was found that the cattle fed outside made more profitable gains than similar cattle fed under the usual stabling conditions. The experiment is being continued on a larger scale this winter. Following is Superintendent Murray's report of the 1907-8 experiment:—

### Feeding Steers on Brandon Experimental Farm—Outside versus Inside.

*(By James Murray, Superintendent.)*

The feeding of cattle out of doors for the production of beef has been receiving considerable attention of late at the hands of Manitoba cattlemen. The strongest advocates of this method of procuring beef are men who have been successfully practising it for a number of years and those who have seen it in operation. The conditions of outdoor feeding are so radically different from those that have been generally considered essential that the majority of cattlemen are sceptical about it, while many others look upon the practice as ludicrous, and aver that it must involve a wanton waste of feed.

Last fall some work was started to secure definite information as to the comparative economy of making beef in a comfortable stable and in the open with comparatively little shelter. The first lot of steers, thirteen head, has just been marketed and the results are available.

Thirteen were purchased in late November and divided into two groups as nearly alike as possible in size and quality, eight being dehorned and put outside and five (as many as we had accommodation for) tied in the stable. The steers were domestic, purchased in the neighbourhood of Oak River and cost  $3\frac{1}{2}$  cents shrunk. The



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inside group were started on September 3 on a standard ration that has given good results here for a number of years for beef production and consisted of silage, straw, hay, a few roots and grain. The grain ration at the start consisted of two pounds of a mixture of oats, barley, and feed wheat, and two pounds of bran per steer. This was increased from time to time until by the first of April each steer was receiving daily 10 lbs. of grain and 2 lbs. of bran. The steers were not out of the stable after being tied up until they were sold.

The eight steers outside had a range of about 100 acres of rough rolling land some of which was well sheltered with scrub. Water was available in one of the coulees, the ice being cut every day. No shelter by way of sheds was provided. Grain was fed in a trough about three feet wide and high enough off the ground to prevent the steers getting in it. Straw was always kept before them in an inclosure of stakes that would hold about a load, arranged so that the straw could not be wasted by tramping over it. On December 3 they were started on a ration consisting of 2 pounds of mixed grain and 2 pounds of bran, this being increased from time to time, so that by April 1 each steer was getting 9 pounds of grain and 2 pounds of bran. For about six weeks rough hay was fed instead of straw. This is charged for at the rate of \$2 per ton, which is its full value.

Both lots of steers were sold on April 22 for \$4.25 per hundred with 4 per cent shrinkage. Following is a statement of the transaction:—

	Outside.	Inside.
Number of steers in lot.. . . .	8	5
First weight gross.. . . .	8,854 lbs,	5,695 lbs.
First weight average.. . . .	1,106 "	1,139 "
Finished weight, gross.. . . .	10,630 "	6,950 "
Finished weight, average.. . . .	1,328 "	1,390 "
Total gain in 138 days.. . . .	1,776 "	1,255 "
	Outside.	Inside.
Average gain per steer . . . . .	235 lbs.	251 lbs,
Daily gain per steer.. . . .	1.6 "	1.81 "
Daily gain per lot . . . . .	12.8 "	9.05 "
Gross cost of feed . . . . .	\$100 76	\$77 95
Cost of 100 lbs. gain . . . . .	5 67	6 20
Cost of steers fed out of doors, 8,848 lbs. at 3½ cents.. . . .	276 50	
Cost of steers fed indoor, 5,695 lbs. at 3½ cents . . . . .	.....	177 97
Total cost to produce beef.. . . .	377 26	255 92
Out of door steers sold, 14,135 lbs. at 4¼ cents, less 4 per cent.. . . .	433 71	
Indoor steers sold, 6,950 lbs. at 4¼, less 4 per cent . . . . .	.....	283 56
Profit on lot.. . . .	56 45	27 64
Net profit per steer.. . . .	7 05	5 52
Average buying price per steer . . . . .	34 56	35 59
Average selling price per steer . . . . .	54 21	56 71
Average increase in value.. . . .	19 65	21 12
Average cost of feed per steer.. . . .	12 59	15 59
Amount of meal eaten by lot of steers..	8,892 lbs.	5,390 lbs.
Amount of straw.. . . .	8 tons.	5,680 "
Amount of hay.. . . .	6 "	2,840 "
Amount of millet . . . . .	1 "	
Amount of ensilage and roots . . . . .	.....	25,850 "
Amount of corn fodder . . . . .	1 ton.	



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## INVESTMENT OF LABOUR.

The net profit as shown here, \$5.52 on those fed inside and \$7.05 on those fed outside, makes no allowance for interest on investment or labour involved in tending the cattle. For the outside lot the only investment was the price of the steers and the value of lumber for troughing, a total of \$286. The labour incident to attending this lot, including the drawing of straw, feeding grain and cutting ice would at the outside not amount to more than the time of one man for one hour per day. The extra expense in attending 50 head would have been not more than the time required to draw the additional straw—a small item.

In feeding inside the investment is necessarily very much greater, no matter how economically the building be done. Provided a building suitable for stabling 30 steers could be erected for \$1,000, an additional gross profit of \$2 per head would be required to meet interest on the investment. The labour required to attend to the cattle fed inside was fully four times as much as that required when the feeding was done outside.

The point has been raised in discussions on this subject that a large part of the feed consumed by the cattle fed outside must be utilized to keep up the animal heat, and since those fed in a comfortable stable do not have the same waste of heat to provide for in the food consumed, they should on that account lay on fat more economically. It must be borne in mind, however, that cattle that are not stabled grow a coat of hair more resembling in its density that of a beaver than that of a steer, and that this provision aids greatly in conserving the animal heat. During the coldest weather that we had this winter, when for a week the temperature averaged 29° below zero, the steers did not seem to suffer the least, and were not standing around the straw pile with humped backs as one might imagine.

The cattle were always ready for their feed and none of them went off during the winter. The abundance of fresh air has no doubt a salutary effect in keeping the digestive system in tone.

The work carried on this winter is intended as introductory to more extensive trials. Experiments of the sort above outlined must be continued for a number of years, when different kinds of seasons are encountered, before the results can be considered of any great value. The past winter's results may be taken as representing what may be expected in an unusually mild winter free from severe storms or prolonged cold spells. How these results will compare with what may be obtained in a more severe winter remains still to be seen.

### Outdoor Feeding by a Private Owner.

The results achieved at the Brandon Experimental Farm in the one season tried have been verified over and over again, year after year, on Manitoba farms. The following description of a number of years feeding near Newdale prepared by Mr. Grayson, Mount Pleasant stock farm, of that place, and published in the *Nor'West Farmer*, shows the method to be a profitable one even in severe seasons:—

Some fifteen years ago Mr. John B. Cook, of Newdale, in connection with the late Dr. Harrison, built a large barn and started somewhat extensively into the business of winter feeding of beef cattle. After about three years' experience during which time the balance was always on the wrong side of the ledger, another bunch of cattle was bought and fed hay in the shelter of the scrub which extends along the north side of the farm, the intention being to bring the cattle to the barn as the weather got colder. The cattle had access to open water in the ravines and appeared to be doing so well that they were left out all winter. A small allowance of grain was added to the hay about March 1. These cattle were sold early in the summer and were the first cattle to net their feeders a profit. Since that time Mr. Cook has



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continued to feed from sixty to one hundred head of steers each winter, and the writer, as well as others, has done something along the same line with satisfactory results.'

'In this article I propose to give some idea of the work carried on here. In doing so I know I shall say things that are at variance with what most of us believe to be essential to the production of beef, but I would ask readers to remember that what I am writing is actual experience and not theory. Years ago Mr. Cook's plan was to buy in the fall a bunch of cattle, big, lean steers and thin cows and heifers, almost anything with a large frame that might be made to carry meat. But to-day nothing is selected but steers of good beef conformation and weighing from 1,100 to 1,300 pounds in the fall, steers that carry a considerable amount of flesh. Experience has proved that the fleshy steer is the most profitable to winter and makes better gains than the leaner one in the bunch, and we rarely find a steer so fat from the grass that he will not stand a finishing spell with grain. These steers have usually been bought from some regular cattle buyer, a premium being paid for the privilege of selecting suitable feeders.

'The steers are usually bought during October and allowed to run on the farms until winter sets in in earnest. As early as convenient after the steers are bought they are dehorned. Clippers are used for this purpose and a handful of lime is pressed on each stub to assist in checking the bleeding. With the approach of winter the steers seek the shelter and straw is drawn to them.

#### CRITICISMS ANSWERED.

'I have noticed from questions that have been asked me and from criticisms that the generally held idea regarding shelter is, that the cattle retire into the bottom of some thickly wooded ravine or into some heavy bush where they would be almost as much shut in as they might be in some sod building without windows. Instead of this the cattle prefer the high open spaces, with just enough scrub to prevent the snow from drifting over the straw. The cattle enjoy the life and especially enjoy the sunshine so long as the winds are broken from them.

'Here I may speak of another point and that is the manure. One of my critics of a previous article seemed to think that it would be out of the question to gather the manure from among the scrub. Now if straw is fed in a comparatively limited open space, until it reaches a depth of two or three feet of straw and manure, I fail to see the difficulty of getting it gathered up. And I contend that I know of no better way to convert large quantities of straw into useful manure than by feeding it liberally out of doors to grain fed cattle. In feeding straw it is necessary to use much more than the cattle will eat up clean, as by this means the cattle can always have a comfortable bed, and we aim to have them comfortable.

'About the first of December, or earlier, if the weather is severe, the cattle are given about four pounds of grain each day. The grain is all fed in the evenings in troughs about three feet wide, eight inches deep and raised about two and a half feet from the ground. The grain ration consists of a mixture of oats and barley chopped (barley principally) and bran, about one-third bran by weight. Finely ground chop gives best results and is most appreciated by the cattle. It is our plan to feed about sixteen hundred pounds of grain per steer during the feeding period, and the ration is increased in January to about eight pounds per steer per day and about April to ten pounds. This is continued until about June 20, when the steers are sold. If the grass becomes good in June less grain is needed at the finish.

'In feeding cattle on such dry ration, watering is of considerable importance. Those who are so situated that cattle can have access to open water at all times are especially favoured for this work; the cattle need to drink frequently and in small quantities. Where water is not so easily available it must be kept in the trough as much as the severity of the weather will permit, as a large drink of cold water follow-



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ing long abstinence would chill any animal and cause temporary check to digestive processes. In regard to salt, we usually place a barrel in some convenient place and knock the head in.

'In carrying cattle until June, it is a great help if one has hay enough to feed for about a month after the snow goes, and by confining the cattle, so that they will not ramble too far, they can be made to at least hold their own during this trying period. The object in carrying cattle until June has been to wait for a profitable market. If the market on, say the first of April, was anything like equal to the market of June, I am sure that good results would follow the feeding of the same total quantity of grain in the shorter period.

'Now as to our business methods.—The steers are bought when cattle are at about the lowest, a premium over the market being paid for the privilege of selecting steers of approved type. In working out our balance sheet we have been in the habit of charging the grain fed to the cattle at the rate of 80 cents per 100 pounds. This we consider a fair price in an ordinary year. We charge interest, wages, and all necessary expenses and have been able with a margin of  $1\frac{1}{2}$  cents per pound between buying and selling price to have a balance on the right side of about an average of seven dollars per head.'

### Experiences of Others.

The question of outdoor winter fattening was discussed at considerable length at the National Live Stock convention. The view held by many western grain growers, that winter fattening cannot be profitably done in the prairie provinces, was freely expressed, but it was just as readily refuted by those who spoke from experience. A delegate stated that he knew of a carload of cattle fed in the open air during the winter of 1896-7 on prairie hay and water, the gain averaging 100 pounds per head. Another speaker explained that 90 head averaging 1,250 pounds in the autumn, were made to weigh 1,400 pounds by spring, fed in a ravine in Manitoba. The feed consisted of straw and chaff that would otherwise have been burned, with grain chop. Charging for the grain and the labour, the steers made a clear profit of sixteen dollars (\$16) per head. After summing up the various arguments presented, the chairman of the convention pointed out that it was simply the old story—some men could make it pay, while others, too careless or too lazy to do the thing properly, would fail in the fattening of cattle as they would in any other undertaking.

There are thousands of wheat growers who spend their winters in idleness after marketing the season's harvest. Continuous good crops, desirable as they are, have very great disadvantages for the farming community. Already are to be found in these new provinces, districts yielding little more than half the returns per acre they did some years ago, and while the yield, following continuous cropping, is going down, the land is becoming foul with weeds, whereas, a system of mixed farming, including the feeding of the straw and other rough feed to cattle, together with a suitable system of rotation, involving spreading the manure on the land, builds up the soil, keeps it clear of weeds, and hastens the ripening of the grain, thus reducing the danger from early frost.

There are in certain sections of the west, farmers who finish their cattle during the summer and ship them to the British market. An example of this may be seen on a farm near Moosomin, where Mr. R. J. Phin, is devoting his attention to this work. He handles about nine hundred (900) head each year, sometimes shipping direct to the old country. These cattle are gathered largely around Moosomin, and in the Moose Mountain country, where there is abundance of water and grass. The chief points of interest regarding his operations are—(a) the finishing on rape of cattle not otherwise fit to ship; (b) winter feeding.



## MR. PHIN'S METHODS.

## (a) Finishing cattle on rape:

'The land intended for this purpose is treated as a summer fallow during the early summer, and about the first of July is sown to the forage crop mentioned, two pounds of seed per acre being used, sown in drills. After the sowing is done, manure is applied with spreaders; surface cultivation is followed about once a week, thus keeping the weeds under. The cattle are turned on about September 15, and kept there until the frost sets in; in addition some chopped grain is fed. The cattle come off the rape in prime condition and ship well. The grains fed consist of oats, barley or frozen wheat, depending upon the price at which these may be obtained. Not only are the steers thus turned off in good condition, but the land is cleaned and made to bear a profitable crop of wheat, the straw being strong and the heads well filled. The packing of the soil seems to have the effect of preventing a rank growth of straw and also hastens the maturing of the crop. In 1908 sixty-five (65) acres were under rape, but some years double this quantity has been sown; this course of husbandry has been followed now for five years with satisfactory results.

## (b) Winter feeding outside:

During the winter months, from one to two hundred steers are fed on cut straw and chopped grain. The equipment is not expensive, consisting of cheap wooden troughs, up about two feet from the ground on the leeward side of the buildings. Adjacent to the buildings is a yard with cheap sheds, but the steers fed there do not seem to make any greater gains than those altogether in the open. As remarked by Mr. Phin, 'A big well-fed steer seems to take little heed of the cold.' The cattle fed are practically all Shorthorn grades, which are preferred, as, in addition to being good feeders, they have size and weight.

The following statement by Mr. W. F. Puffer, M.L.A., of Lacombe, Alta., who is, in every sense of the word, a practical man, will be found both interesting and instructive:—

**INTENSIVE FATTENING.**

(By W. F. Puffer, M.L.A., Lacombe.)

'In the district around Lacombe and Red Deer, and in fact in that part of the province generally spoken of as Central Alberta, the winter feeding of cattle is becoming more general.

There is still plenty of grass throughout the district, but the farmer is already occupying considerable areas. The country is somewhat rolling with abundant water, and dotted with frequent groves of poplar and some spruce, affording excellent opportunity for winter feeding in the open without the expense of stabling.

The method of feeding which is now being generally followed and which, after an experience of twenty years of cattle feeding, the most of the time in Alberta, I have myself found to give the most satisfactory results, I will describe briefly.

First, let me say that I strongly favour feeding in the open, and that I am convinced that many of those who attempt feeding cattle do not feed grain with sufficient liberality to obtain the best results. This, I believe, is one reason why Canadian cattle are generally quoted on the Liverpool market one cent per pound lower than United States' cattle. In the United States feeding districts, cattle are put on a full feed of corn almost from the start, which is kept before them constantly for six or eight months. One hundred bushels of corn is reckoned as the requirement of an ordinary steer during the feeding period. This method gives rapid gains, pro-



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ducing better cattle, which make better prices, than where limited grain rations are fed. The disposition of a thoroughly fattened steer is changed; he becomes docile and contented, ships better and thus brings a better price at the end of his life's journey. We have just as good cattle here as in the United States. Chopped barley, wheat and oats are fully equal to corn as a fattening ration, but we must give the cattle all they will eat of it, and when we learn to do this, I contend that our cattle will not sell at a lower price on the British market than United States' cattle.

I have been pleased to note that some good work is being done by the superintendent of the Experimental Farm at Brandon in outdoor cattle feeding, and I have read with interest reports of other Manitoba farmers who are experimenting along similar lines. I cannot help but think, however, that all these experiments would be better if they would adopt the method I here attempt to describe. At the time the Experimental Farm cattle were sold at Brandon last spring for  $4\frac{1}{2}$  cents, which I fancy was about their value, a good many cattle were being sold here for  $4\frac{1}{2}$  cents, but our best feeders were getting  $4\frac{1}{2}$  to 5 cents for cattle for export, and they had to contend with the long rail journey, extra freight and shrinkage and other expenses which would make cattle cost to the dealer in Montreal from 6 cents to  $6\frac{1}{2}$  cents per pound.

## THE METHOD.

Where there is no natural shelter, a corral with a tight board fence about 7 feet high, with a rough, straw covered shed for stormy weather is necessary, and even where there is good natural shelter, cattle will do better with a roughly improvised shed in which to lie down during stormy weather. The rest of the equipment consists of racks for holding hay or rough feed, which should always be kept filled, and the cattle allowed access to them at all times. The grain feeding bunks should be placed in the centre of the corral or in the open, where the cattle can get all round them. They should be about  $2\frac{1}{2}$  feet high, 3 feet wide, with 8-inch sides to keep in the chop, and if made about 16 feet long will be found convenient. With cattle not dehorned, and until they are on full feed, about one of these bunks to every eight head is necessary; after they are on full feed a bunk would accommodate more cattle. Self-feeders may also be used and are very satisfactory.

It is perhaps needless to say that attention to the smallest details is absolutely essential to obtain the best results in the feeding of cattle, and this applies just as emphatically with cattle that are being fed in the open, as under the most artificial conditions. They must be provided with plenty of bedding, good clean straw a foot deep; all frozen lumps of manure should be regularly removed so that cattle may have 'solid comfort.' Remember that when cattle are lying down quietly and comfortably chewing their cud they are making the most money for the feeder.

As above stated, the feed racks should always be kept filled, and I always like to supply the best hay at the first of the season before the cattle have got on to the full grain feed.

I find, like Mr. Grayson of Newdale, that finely chopped grain is best, being more easily digested. Barley and oats ground together is what is usually fed; sometimes oats and wheat, but I have had better results from feeding barley alone. I like to put in three-year-old steers weighing about 1,200 pounds; I begin feeding about December 1st, 5 pounds of chop once a day, gradually increasing this till about the 15th of the month to 4 pounds twice a day, which is still further increased until by the end of the month 6 pounds twice a day is being fed. This is gradually increased for the next ten days or so, when a little chop will be left over in the bunks; they should then be filled up and never allowed to get empty. I find more grain is eaten the third month than the second. Steers, such as referred to above, will sometimes average two pounds per head per day when on full feed, depending on the size of the steer and the quality of rough feed and also, to some extent, on the weather. Steers



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of good breeding will gain in weight in five months from December 1 to May 1, from 350 to 500 pounds. Such steers will continue growing after the date mentioned until sold, and I am sure no one ever yet experienced any difficulty in getting a good price for such cattle in the spring.

I suppose objection would be raised to the amount of grain fed, but I contend that half-way methods don't pay, and in my experience, the results obtained justify the extra quantity of grain. On limited rations, steers do not become contented; they remain on their feet too much of the time playing and fighting, thus wasting a certain amount of the feed consumed, whereas when put on full feed, even the wildest cattle soon become lazy and lie down a great deal of the time, when, as I have already said, they are making flesh economically.

Another important item is the water supply, and it is most essential that water should at all times be available. If water is supplied from a well, a tank heater is a necessity to keep the water in the troughs from freezing, and it will pay for itself in a short time if twenty head or over are being fed. If the water is supplied from a lake or a stream then ample water holes should be provided, and attention should be given that these are made convenient for drinking from, so that the animals can stand comfortably. This can be done by making a long opening in the ice, say not over twelve inches wide, and as long as necessary. A little ledge should be left all around the edges of the water hole to keep their feet from slipping in, and the ice should be chopped away at the back so that their hind feet are down almost on a level with their front feet. The ledge round the water hole will also prevent the water from becoming contaminated on warm days. Barrel salt I find best and it should not be allowed to get lumpy or hard.

### Operations of a Large Firm.

Many other Alberta feeders are adopting intensive fattening methods. A representative of this Branch, travelling in Alberta, reports the operations of one firm that had in the winter of 1908-9, 1,400 head on feed at three points—Carbon, Midnapore and High River. At High River, where 485 head were feeding, the cattle had only a bush shelter on the banks of the river. In January when visited they were getting all the hay they could eat, and a meal ration of 16 pounds per day. The meal consisted of a mixture of two-thirds oats and one-third barley ground fine. This meal was fed in self-feeders of which there were thirty, these being filled every second day. The cattle when seen in extremely cold weather appeared comfortable and contented. They were eating comparatively little hay—about four tons per day, or 16 pounds per head, which is about equal to the weight of meal consumed. They had free access to salt and to High River water. While they had not been weighed they appeared to be putting on weight rapidly. Three men were able to look after this herd of 485 head, including the work of grinding the grain by means of an engine and chopper.

### WINTERING CALVES.

There is perhaps no greater loss in the entire ranching industry than that arising from the usual methods of wintering calves. Not only are many promising calves lost from exposure and shortage of feed during severe periods, but practically all that have come through the winter have lost weight and become stunted for future growth. Those who have taken the trouble to weigh their calves in fall and again in spring have been surprised to learn that fully 200 pounds of flesh per head have been sacrificed by allowing the youngsters to take their chances on the range along with the herd. Calves that weighed 600 pounds at the beginning of winter had actually shrunk to 400 pounds by spring, losing just one-third their weight, and this all flesh, as neither bone, hide nor horn had been reduced. Any stockman can readily imagine the time



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it requires for such animals to regain the lost ground. It is fair to estimate that fully a year is lost in the animal's growth and a year delayed in the time the ranchman must wait for the price of his crop of steers.

Is there a better way practicable? That is the question which concerns the cattleman. Housing is not an easy problem and help is expensive, but something must be done to prevent or reduce the enormous loss from fatalities, shrinkage and stunting, that goes on from year to year. A year's saving of time and feed would do a great deal towards a provision for caring properly for the calves, especially since it can be done without expensive housing, or even the feeding of grain.

Many up to date ranch owners are recognizing the importance of proper shelter and feeding and make special provision for the calves during the first winter. Rough sheds are constructed in which they are run loose and fed on hay and oat sheaves or other suitable feed. Others bring their calves through successfully without the sheds. Mr. W. E. Tees, of Tees, Alberta, the owner of a herd of good cows, winters his calf crop satisfactorily without buildings. Describing his experience and system, Mr. Tees writes as follows:—

'I will try to give you my plan and experience in wintering calves. I have never weighed before or after wintering, but I am sure I can bring them through the worst winter in very satisfactory form. During the hard winter of 1906 I had to change my usual plan, as the snow was too deep for grazing, so I held them in a yard or corral. That winter I had some 40 head, and fed them on wild hay and green cut oat feed, and I certainly had a fine bunch of calves in the spring with no loss. I will try and explain my usual plan, describing what I am doing this winter:—

First, I have a good amount of pasture land under fence; in the fall I cut and bunch all the available hay on wild land and leave it in the bunch for calves to run to. Then there is usually some fall wheat or rye stubble land, as I do not fall plough, and I have plenty of straw stack for them to run to. About the last of October, I take the calves from the cows. I place them in a large pasture of twenty or more acres, under high pole fence, securely built, so that it is impossible for them to get to the cows, but still have a good range. There I give them the best of hay, with either a straw stack or some green feed. In 48 hours after separation I let them all to the cows again, but this is really to benefit the cows, as by letting them drain the cows at this time there is no danger to the cows' udders. This plan I have always followed. I do not try to drive the cows to another inclosure, as some do, but they are separated from the calves only by this pole fence, therefore they are near each other all the time. It is surprising how little they worry and fail. The weaning is accomplished without perceptible shrink or falling off in flesh. In about two weeks' time I can turn them into the stubble field where they have access to wild hay and where they will remain till grass comes in the spring. However, should the feed mentioned not hold out, I am careful to take them plenty of wild hay. I do not feed any grain and have no buildings for them, only the bush and straw stacks.'

### RAILWAY TRANSPORTATION.

The best of beef may be raised and finished in our western provinces, but unless it can be marketed in good condition, and at reasonable cost, its production is not likely to be continued. The home demand will of course grow, as population increases and towns and cities multiply, but farming is certain to remain the chief industry and beef production will undoubtedly always exceed local requirements. Outside markets will therefore be necessary and the means of reaching them must be duly considered.

The transportation facilities furnished to western cattle shippers have, for long, been declared altogether inadequate. It is charged that the supply of stock cars is irregular, uncertain and insufficient, their construction faulty, their equipment defec-



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tive, that engines are overloaded and the speed of trains thereby greatly lessened and that as a consequence of these conditions cattle in transit undergo much needless suffering and their owners serious financial loss. While there is doubtless good ground for these complaints much of the trouble unquestionably arises from the fact that until within the last year or two, export shipments have been confined to a period, little, if any, exceeding three months during which one railway company has had, in addition to meeting the demands of ordinary live stock traffic, to do its best to move from 50,000 to 80,000 head of cattle over an average distance of 2,000 miles. The cattle shipping season in each year also overlaps the great eastward grain movement during which every effort must be made to get the crop to the terminal elevators before the close of navigation. In spite of these extenuating circumstances, however, there is both need and room for improvement, and although the adoption of winter feeding, which will change and extend the shipping period, and the near advent of railway competition will doubtless greatly better existing conditions, the reasonable demands of the present day trade must be given reasonable consideration.

At the National Live Stock convention held here last year, the western cattlemen present declared that without prompt and radical reforms in transportation methods their export trade could not, under the altered conditions of beef production, be any longer profitably carried on. As a result of the statements made by these gentlemen, the convention passed unanimously a resolution that the matter should be referred to the Railway Commission for action and it is very gratifying to know that, on the request of the western stock growers, that Board is, with characteristic promptitude, now actively engaged in remedying as far as possible the faulty conditions which have caused so much dissatisfaction and given rise to so many complaints.

#### SHIPPING HINTS.

In shipping cattle practical experience is of immense value and if the shipper himself is lacking in this qualification, he should endeavour to secure the services of a reliable and trustworthy man, especially if he intends doing business on an extensive scale. By following this course he will save himself much time, worry and money. This is particularly true in the case of shipments to distant and above all to foreign markets. Unless one knows the ropes, he is certain to find himself often at a loss and so driven into the hands of commission men and others who, whatever they may do for their regular customers, seldom show much compassion or consideration for the chance wayfarer, who is trying to do business on his own account. Loading must be carefully watched—overcrowding in a single car of a train load may mean a heavy loss. Cars should be clean and well bedded or sanded to prevent slipping; they should be in good, sound condition, and each should be closely examined inside to ensure that there are no projections such as splinters, bolts or nails likely to injure the stock.

Where hay is fed in transit, its distribution should be carefully supervised and at any time when car doors have been opened they should be properly closed before the train moves.

At feeding points the shipper must insist on ample time and space being allowed for rest, and must see that the feed and water supplied are of good quality and that each animal has an opportunity to get its reasonable share of both.

Undue delays in furnishing cars or in the movement of trains as well as all cases of injury to stock through rough handling, violent shunting, or otherwise should be promptly reported to the proper railway officials, who are generally more interested than their subordinates in seeing that satisfactory treatment is afforded to shippers. By looking sharply after their own interests in matters of this kind shippers will avoid much annoyance as well as financial loss.

It is almost superfluous to say that cattle ship much better when dehorned. This should, however, be done sometime beforehand, preferably when close feeding begins



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or better still when they are calves. The dehorning of range cattle which are to be winter fed is especially advisable as it tends to make them quieter and much more peaceable than when the horns are left untouched.

**THE DRESSED MEAT TRADE.**

Fully aware of the disadvantages attending the present methods of marketing, the more advanced thinkers among our western stock growers have, for a long time been earnest advocates of the establishment of a dead meat trade. There is no doubt that if the enterprise were properly financed, started on a sound basis and conducted in an honest and business-like manner in the general interest of the producer, there would be far less actual wastage than at present. It is altogether likely that, had it been possible to secure the required capital, the trade would have been inaugurated years ago. For such an undertaking on a scale sufficiently extensive to furnish effective relief, however, a great deal of money is necessary and as our western ranchers are, like the eastern farmers, not much in favour of the co-operative principle, while several large interests have been rather opposed to any change in existing conditions, nothing definite has yet been done. A number of packing establishments in which both beef and pork are prepared for local and Pacific coast trade are now in operation in Alberta and Manitoba, but no serious attempt has ever been made to develop and build up an export industry in meats or meat food products. It is true that in recent years some members of the great American Meat Trust have established outposts in the Canadian west with results, so far at least, beneficial to the stockmen, and it is possible that this action on their part may be only preparatory to larger operations, provided the field is found to be sufficiently promising. It is questionable, however, bearing in mind the methods usually followed by these gentlemen, once their grip is assured, whether the establishment of a Canadian dead meat trade under their auspices is a consummation devoutly to be wished.

Such an enterprise to be productive of the greatest benefit to all concerned, should be under effective public control, and it is to be hoped that in the not too far distant future some practicable scheme will be evolved which, while affording a better and more reliable and regular market for our western live stock, will still leave the producer free from the trammels of any trust, whether foreign or domestic.

**ADVANTAGES OF DEAD MEAT TRADE.**

The advantages to be gained from the establishment of an export trade in dressed meat are, in the opinion of those who have most fully and carefully considered the subject, quite beyond question.

In the first place, as has already been shown there is a very serious loss from the unavoidable shrinkage which occurs in the carriage of live cattle by land and sea over the enormous distance which separates the original seller from the ultimate buyer. While this shrinkage will, no doubt, become proportionately smaller with the general adoption of improved methods of handling, finishing and transporting the stock, it can never be entirely eliminated and even when reduced to a minimum, it will, I think, be found to constitute the determining factor in establishing the superiority of the dead meat trade from the profit point of view, at least as far as concerns all cattle except those of the very best quality and finish.

As will be shown later there is good ground for the belief that animals of the class last mentioned will continue to be profitably disposed of on the hoof.

Secondly, the competition which would be afforded by a sanely established, honestly conducted, and properly controlled dead meat trade would have a marked steadying effect on the prices paid to producers. With such a trade in constant operation, we



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would not see so often the fluctuations in values which now occur, and which are often undoubtedly due to friendly arrangements between buyers, many of whom unfortunately appear unable to resist the temptation to feather their own nests unfairly by unduly cutting prices when stock is plentiful and easy to obtain. Dealers in Canada as well as in the United States and other countries never seem to learn that tactics of this sort cannot be counteracted by the payment of high prices when stock is scarce and when, as a rule, but little remains in the hands of the producer. Scarcity of this kind is almost always attributable to the discouragement and disgust of the farmer or feeder, who, feeling that he has not received fair remuneration for his feed and labour, disposes of all his stock and ceases to be a producer. If buyers of live stock, which, to a greater degree than any other farm product, suffers from petty price manipulations, could only be made to grasp the fact that the time for small profit margins is when prices all round are low, they would soon begin to reap the benefits of self denial in the form of a steady supply, and a regular if perhaps not excessively profitable trade. So long as they continue as at present to shake the confidence of the producer by scheming for unjust profits when stock is plentiful, so long will they continue to suffer, as many of them are now doing, from a shortage of raw material, not only disastrous to themselves, but involving great national loss.

Another and by no means unimportant reason for the establishment of a dead meat trade is one which has been plainly set before us on two different occasions within recent years.

In 1902 and again during the winter just past, foot and mouth disease made its appearance in the United States, with the result that large areas were in each instance at once debarred from participation in the export live stock trade. While this was serious enough for those portions of the United States concerned, it was, for geographical reasons, of trifling importance, when compared with the results which would inevitably have followed a similar outbreak in Canada.

The United States has a long Atlantic coast line, and many different seaports, situated far apart, and served by numerous widely separated lines of railway. They have also, in constant operation, a complete system of fully equipped modern abattoirs, refrigerator cars and ships, which enable them on the shortest notice, to convert their export live stock into dressed meat, which can be sent forward without let or hindrance.

We, in Canada are in an entirely different position; our Atlantic seaports are few in number, and the railways leading to them pass in convergence through a narrow neck of land, measuring only a few miles from north to south.

We were on both occasions, fortunately successful by efforts much more strenuous and exacting than is perhaps realized by the majority of Canadians, even those most interested, in preventing the introduction to the Dominion of this notoriously infectious and easily transmitted disease. Had these efforts failed our export live stock trade would have been stopped at once. The British authorities would undoubtedly, and from their point of view, very properly, have prohibited the importation from Canada of live cattle, as well as sheep and swine. As a matter of fact, it was only with the greatest difficulty that they were induced to refrain from scheduling Toronto and a large portion of western Ontario during the last outbreak in which the States of New York and Michigan were involved. This attitude on their part was due to the fact that in the advices from Philadelphia, the origin of the outbreak in Pennsylvania, which was the first to be recognized, was wrongly attributed to a shipment of cattle from Toronto. I was fortunately, at the time, in close personal communication with the British Board of Agriculture, and it was only by the strongest representations that the action above indicated was averted. The Board, however, insisted on a farm to farm inspection of the whole of the area to which any suspicion could possibly be attached, and it was, therefore, at its direct instance, that this particular line of work was undertaken and carried out.



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Canada is practically without abattoirs equipped for the slaughter of cattle except to a very limited extent for the home market; she has no system of refrigerator meat cars, and has, entering her ports, very few ships fitted for the carrying of chilled meats. In view of these facts, it is scarcely necessary to dwell on the risk which she is constantly carrying. At any time, in spite of the best efforts of her veterinary sanitary service, the appearance within her borders of one or other of the diseases scheduled by the British Board of Agriculture, is within the range of possibility. As matters now stand, were such a thing to occur, especially during the short period in which our western cattle are shipped, or at the time when our winter fed steers are being marketed, the consequences to the producer would be disastrous, while the whole trade would receive a blow, from which it would require many years to recover. For this reason, if for no other, the establishment of a chilled meat trade on sound business lines and under proper control, may fairly be termed a matter of national importance.

### LIVE CATTLE TRADE MUST BE CONTINUED.

It must not be forgotten, however, that there is a constant paying demand in Britain for home-killed dressed beef. This demand is certain to continue and as it can never, under existing conditions, be fully met by the British feeder, it is likely to remain profitable to those countries which, owing to their freedom from disease, are permitted to land live cattle in Great Britain, and are at the same time so situated geographically as to be able to transport such cattle at a reasonable cost and with not too great a risk of loss.

In these two respects Canada occupies, and will probably continue to occupy, a most favourable position. Many countries which, under other circumstances, would be our keenest competitors, have been compelled, for one reason or another, to abandon their export trade in live stock for that in chilled or frozen meat. As they are year by year improving their facilities for the carrying on of this trade, the supply of dead meat in the British markets, is likely, in the near future, to exceed the demand. In the United States, the only country at present in a position to compete with Canada in the live cattle trade, the home consumption of meat is increasing so rapidly, that the surplus for export is likely soon to be a negligible quantity.

It would thus appear that while the establishment of a chilled meat trade is necessary and advisable, it would be a short-sighted policy to contemplate the complete abandonment of our present export business in live stock. It should, therefore, in my opinion, be not only continued, but fostered and encouraged, by making the conditions surrounding it as nearly perfect as possible. This can best be done by the maintenance of strict government supervision, involving full control of the methods adopted in transportation and the establishment of some comprehensive system of inspection, which, in addition to the present examination for health, would include the rejection of any animal of inferior quality or condition.

It is, to my mind somewhat doubtful whether it would be possible, in the face of the keen competition of an honestly conducted dead meat trade, to profitably ship grass fed cattle on the hoof from western Canada to the British market. There is, however, no question that given better transportation facilities than at present exist, a profitable business could be done in grain fed western steers, as well as in the stall-finished cattle from Ontario and other eastern provinces.



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In any event it is well to have two strings to one's bow and as each line of trade would steady and balance the other, it is to be hoped that, in the near future, we shall see both firmly established on a solid and paying basis.

I have the honour to be, sir,

Your obedient servant,

J. G. RUTHERFORD,

*Veterinary Director General,  
and Live Stock Commissioner.*

The Honourable SYDNEY FISHER,  
Minister of Agriculture.



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